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# **Encoder Model D9032**

User and Service Manual

Software Version 2.11

**Please Read This Entire Guide**

**Veillez lire entièrement ce guide**

**Bitte das gesamte Handbuch durchlesen**

**Sírvase leer completamente la presente guía**

**Si prega di leggere completamente questa guida**

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**Important:**

Please read this entire guide before you install or operate this product. Give particular attention to all safety statements.

**Important:**

Veillez lire entièrement ce guide avant d'installer ou d'utiliser ce produit. Prêtez une attention particulière à toutes les règles de sécurité.

**Zu beachten:**

Bitte lesen Sie vor Aufstellen oder Inbetriebnahme des Gerätes dieses Handbuch in seiner Gesamtheit durch. Achten Sie dabei besonders auf die Sicherheitshinweise.

**Importante:**

Sírvase leer la presente guía antes de instalar o emplear este producto. Preste especial atención a todos los avisos de seguridad.

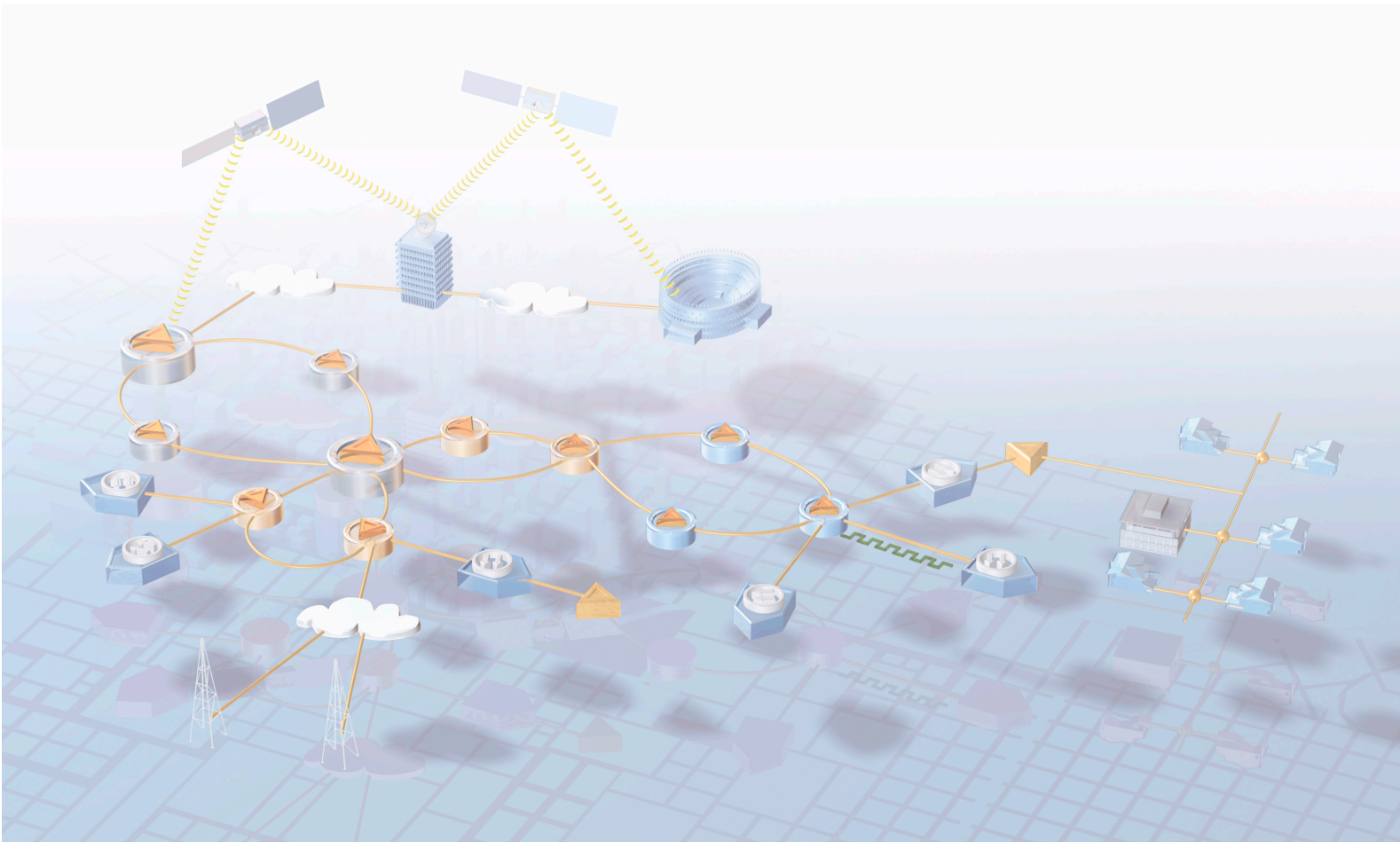
**Importante:**

Prima di installare o usare questo prodotto si prega di leggere completamente questa guida, facendo particolare attenzione a tutte le dichiarazioni di sicurezza.

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# Encoder Model D9032

User and Service Manual  
Software Version 2.11



# Notices

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## Safety Precautions

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### Protect yourself from electric shock and your system from damage!

- This product complies with international safety and design standards. Observe all safety procedures that appear throughout this guide, and the safety symbols that are affixed to this product.
- If circumstances impair the safe operation of this product, stop operation and secure this product against further operation.

**Avoid personal injury and product damage! Do not proceed beyond any symbol until you fully understand the indicated conditions!**

	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates important operating or maintenance instructions.
	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates a live terminal; the symbol pointing to the terminal device.
	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates a protective earth terminal.
	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates excessive or dangerous heat.

### Power

- **Important!** This is a Class I product. You must earth this product.  
This product plugs into a socket-outlet. The socket-outlet must be near this product, and must be easily accessible.
- Connect this product only to the power source that is indicated on the back panel of this product.
- If this product does not have a mains power switch, the power cord serves this purpose.

### Enclosure

- Do not allow moisture to enter this product.
- Do not open the enclosure of this product unless otherwise specified.
- Do not push objects through openings in the enclosure of this product.

### Cables

- Always disconnect all power cables before servicing this product.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.
- Do not walk on or place stress on cables or plugs.

### Fuses

- When AC-supplied, the D9032 Encoder has double pole neutral fusing.
- Always use a fuse that has the correct type and rating, and is approved for use by the country or jurisdiction where this product is installed.
- The correct fuse type and rating are indicated on this product.

### Factory service

- Refer service only to service personnel who are authorized by the factory.





# Règles de sécurité

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**Protégez-vous des risques d'électrocution et protégez votre système contre les endommagements éventuels.**

- Ce produit respecte les standards internationaux de sécurité et de conception. Veuillez observer toutes les procédures de sécurité qui apparaissent dans ce guide, ainsi que les symboles de sécurité qui figurent sur le produit.
- Si, du fait des circonstances, ce produit cesse de fonctionner normalement, cessez de l'utiliser et empêchez-en l'utilisation future.

**Évitez le risque de blessures et de dommages aux produits! Ne procédez à aucune tâche tant que vous n'aurez pas entièrement assimilé les conditions indiquées par un symbole!**

	Ce symbole figure dans la documentation accompagnant ce produit. Il indique d'importantes instructions de fonctionnement ou d'entretien.
	Ce symbole peut être attaché à ce produit. Il indique une borne sous tension; la direction indique la borne.
	Ce symbole peut être attaché à ce produit. Il indique une borne de terre de protection.
	Ce symbole peut être attaché à ce produit. Il indique une température excessive ou dangereuse.

## Alimentation

- **Important!** Ce produit fait partie de la classe I. Vous devez le mettre à la terre.
- Ce produit se branche dans une prise murale. Cette dernière doit être placée à proximité du produit et doit être facilement accessible.
- Ne branchez ce produit qu'à la source d'alimentation indiquée sur son panneau arrière.
- Si ce produit n'a pas d'interrupteur d'alimentation générale, le cordon d'alimentation remplit ce rôle.

## Enceinte

- Ne laissez pas l'humidité pénétrer dans ce produit.
- N'ouvrez pas l'enceinte de ce produit, sauf instructions contraires.
- Ne forcez pas d'objets dans les ouvertures du boîtier.

## Câbles

- Débranchez toujours tous les cordons d'alimentation avant de réparer ce produit.
- Tirez toujours sur la prise ou le connecteur pour débrancher un câble. Ne tirez jamais directement sur le câble.
- Ne marchez pas sur les câbles ou les prises et n'y exercez aucune pression.

## Fusibles

- Si alimenté par une source, le D9032 Encoder a fondre double pôle/fusible au neutre.
- Veillez à toujours utiliser un fusible de type et de puissance adéquats agréé par le pays ou la juridiction d'utilisation du présent produit.
- Le type et la puissance des fusibles à utiliser sont indiqués sur le produit.

## Réparations effectuées à l'usine

- Ne confiez les travaux de réparations qu'au personnel autorisé par l'usine.







# Sicherheitsvorkehrungen

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## Schützen Sie sich gegen elektrischen Schlag, und Ihr Gerät gegen Beschädigung!

- Dieses Gerät entspricht internationalen Sicherheits- und Ausführungsnormen. Beachten Sie alle in diesem Handbuch enthaltenen Sicherheitshinweise sowie die am Gerät angebrachten Warnzeichen.
- Sollten örtliche Umstände den sicheren Betrieb dieses Gerätes beeinträchtigen, schalten Sie es ab und sichern es gegen weitere Benutzung.

**Vermeiden Sie Verletzungen sowie Beschädigung des Gerätes! Wenn Sie zu einem der folgenden Warnzeichen gelangen, nicht weiterarbeiten, bis Sie seine Bedeutung voll verstanden haben!**

	Dieses Symbol erscheint auf dem Gerät und/oder in der ihm beiliegenden Literatur. Es bedeutet wichtige, zu beachtende Betriebs- oder Wartungsanweisungen.
	Wenn dieses Zeichen am Gerät angebracht ist, warnt es vor einer spannungsführenden Stelle.
	Dieses Symbol kennzeichnet auf dem Gerät die Anschlußstelle der Sicherheitserde.
	Wenn dieses Zeichen am Gerät angebracht ist, warnt es vor heißen Stellen, die zu Verbrennungen führen können.

## Netzspannung

- **Wichtig!** Dieses Gerät ist ein Produkt der Schutzklasse I. Es muß geerdet werden.
- Das Gerät ist an einer Steckdose anzuschließen. Diese muß sich leicht zugänglich in unmittelbarer Nähe des Gerätes befinden.
- Die Netzversorgung muß den auf der Rückwand des Gerätes angegebenen Werten entsprechen.
- Falls sich kein Hauptschalter am Gerät befindet, dient das Netzkabel diesem Zweck.

## Gehäuse

- Das Innere des Gerätes ist vor Feuchtigkeit zu schützen.
- Das Gehäuse ist nicht zu öffnen.
- Niemals einen Gegenstand durch die Gehäuseöffnungen einführen!

## Kabel

- Vor jeglicher Wartung des Gerätes sind alle Kabel zu entfernen.
- Hierzu grundsätzlich am Stecker oder Verbindungsstück und niemals am Kabel selber ziehen.
- Nicht auf die Kabel oder Stecker treten oder diese einer Zugbelastung aussetzen.

## Sicherungen

- Wenn mit AC-Speisung versehen, der D9032 Encoder hat zweipolige bzw. Neutralleiter Sicherung im Netzteil.
- Immer den korrekten Sicherungstyp mit dem richtigen Nennwert benutzen, der im Land oder innerhalb der zuständigen Gerichtsbarkeit genehmigt ist, wo dieses Produkt installiert wird.
- Angaben zum korrekten Sicherungstyp und Nennwert befinden sich auf diesem Produkt.

## Hersteller-Wartung

Wartungsarbeiten sind nur durch vom Hersteller autorisierte Techniker vorzunehmen.





## Precauciones de seguridad

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### ¡Protéjase contra la electrocución y proteja su sistema contra los daños!

- Este producto cumple con los criterios internacionales de seguridad y diseño. Observe todas los procedimientos de seguridad que aparecen en esta guía, y los símbolos de seguridad adheridos a este producto.
- Si las circunstancias impiden la operación segura de este producto, suspenda la operación y asegure este producto para que no siga funcionando.

### ¡Evite lastimarse y evite dañar el producto! No avance más allá de cualquier símbolo hasta comprender completamente las condiciones indicadas!

	Encontrará este símbolo en el impreso que acompaña a este producto. Este símbolo indica instrucciones importantes de funcionamiento o mantenimiento.
	Es posible que este símbolo esté pegado al producto. Este símbolo indica un terminal vivo, la flecha apunta hacia el aparato terminal
	Podría encontrar este símbolo pegado al producto. Este símbolo indica un terminal de protección de tierra.
	Podría encontrar este símbolo pegado al producto. Este símbolo indica calor excesivo o peligroso.

### Power

- **Importante!** Este es un producto de Clase I. Tiene que estar conectado a tierra.
- Este producto se conecta a un enchufe. El enchufe necesita estar cerca del producto y ser fácilmente accesible.
- Conecte este producto únicamente a la fuente de suministro eléctrico indicada en el panel posterior del producto.
- Si el producto no tiene interruptor para la línea principal, utilice el cordón toma de corriente para este propósito.

### Cubierta

- No permita que la humedad penetre en este producto.
- No abra la cubierta del producto a menos que se indique lo contrario.
- No introduzca objetos a través de las aberturas de la cubierta del producto.

### Cables

- Siempre desconectar todos los cables eléctricos antes de revisar o reparar el producto.
- Tire siempre del enchufe o del conector para desconectar un cable. Nunca tire del cable mismo.
- No camine ni aplique presión sobre los cables o enchufes.

### Fusibles

- Cuando AC había suministrado, el D9032 Encoder tiene doble polo fusible-neutral.
- Use siempre un fusible del tipo y capacidad nominal correctos y que haya sido aprobado para su uso en el país o jurisdicción en que se instale este producto.
- El tipo y capacidad nominal correctos del fusible se indican en este producto.

### Revisión y reparación de fábrica

Solo personal aprobado por la fábrica puede darle servicio al producto.





## Precauzioni di sicurezza

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### **Protegetevi da scosse elettriche e proteggete il vostro sistema da possibili danni!**

- Questo prodotto soddisfa le norme internazionali per la sicurezza ed il design. Seguite tutte le procedure di sicurezza contenute in questa guida e i simboli di sicurezza applicati al prodotto.
- Se circostanze avverse compromettono la sicurezza d'uso di questo prodotto, interrompete l'uso e assicuratevi che il prodotto non venga più utilizzato.

**Evitare infortuni alla persona e danni al prodotto! Non procedere oltre a qualunque simbolo fino a quando non si siano comprese pienamente le condizioni indicate!**

	Questo simbolo, che appare nella letteratura di accompagnamento del prodotto, indica importanti istruzioni d'uso e di manutenzione.
	Sul prodotto potete vedere questo simbolo che indica un dispositivo terminale sotto tensione; la freccia punta verso il dispositivo.
	Potrete trovare il presente simbolo applicato a questo prodotto. Questo simbolo indica un terminale protettivo di messa a terra.
	Potrete trovare il presente simbolo attaccato a questo prodotto. Questo simbolo indica un calore eccessivo o pericoloso.

### **Alimentazione**

- **Importante!** Questo prodotto è di Classe I. Va messo a terra.
- Questo prodotto si inserisce in una presa di corrente. La presa di corrente deve essere in prossimità del prodotto, e deve essere facilmente accessibile.
- Collegare questo prodotto solamente alla fonte di alimentazione indicata sul pannello posteriore di questo prodotto.
- Se questo prodotto non è dotato di un interruttore principale, il cavo di alimentazione funge a questo scopo.

### **Chiusura**

- Proteggete da umidità questo prodotto.
- Non aprire la chiusura di questo prodotto a meno che non sia specificato diversamente. Non inserire oggetti attraverso le fessure della chiusura.

### **Cavi**

- Staccare sempre tutti i cavi di alimentazione prima di svolgere l'assistenza tecnica al prodotto.
- Per scollegare un cavo tirate la spina o il connettore, non tirare mai il cavo stesso.
- Non calpestare o sottoporre a sollecitazioni i cavi o le prese.

### **Fusibili**

- Se AC fornito, il D9032 Encoder contiene fusibili su fasi/neutro.
- Utilizzare sempre un fusibile che abbia il tipo e la potenza corretti e che sia autorizzato all'uso nel paese o nella giurisdizione nella quale il prodotto è installato.
- Il tipo e la potenza corretti sono indicati sul prodotto.

### **Riparazioni di fabbrica**

- Per le riparazioni contattate solamente personale tecnico autoizzato dalla fabbrica.

# Important Safety Instructions

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## Read and Retain Instructions

Carefully read all safety and operating instructions before operating this equipment, and retain them for future reference.

## Follow Instructions and Heed Warnings

Follow all operating and use instructions. Pay attention to all warnings and cautions in the operating instructions, as well as those that are affixed to this equipment.

## Terminology

The terms defined below are used in this document. The definitions given are based on those found in safety standards.

**Service Personnel** - The term *service personnel* applies to trained and qualified individuals who are allowed to install, replace, or service electrical equipment. The service personnel are expected to use their experience and technical skills to avoid possible injury to themselves and others due to hazards that exist in service and restricted access areas.

**User and Operator** - The terms *user* and *operator* apply to persons other than service personnel.

**Ground(ing) and Earth(ing)** - The terms *ground(ing)* and *earth(ing)* are synonymous. This document uses *ground(ing)* for clarity, but it can be interpreted as having the same meaning as *earth(ing)*.

## Electric Shock Hazard

This equipment meets applicable safety standards.



### **WARNING:**

**To reduce risk of electric shock, perform only the instructions that are included in the operating instructions. Refer all servicing to qualified service personnel only.**

Electric shock can cause personal injury or even death. Avoid direct contact with dangerous voltages at all times. The protective ground connection is essential to safe operation and must be verified before connecting the power supply.

Know the following safety warnings and guidelines:

- **Dangerous Voltages**
  - Only qualified service personnel are allowed to perform equipment installation or replacement.
  - Only qualified service personnel are allowed to remove chassis covers and access any of the components inside the chassis.
- **Grounding**
  - Do not violate the protective grounding by using an extension cable, power cable, or autotransformer without a protective ground conductor.
  - Take care to maintain the protective grounding of this equipment during service or repair and to re-establish the protective grounding before putting this equipment back into operation.

# Important Safety Instructions, Continued

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## Installation Site

When selecting the installation site, comply with the following:

- **Protective Ground** - The protective ground lead of the building's electrical installation should comply with national and local requirements.
- **Environmental Condition** - The installation site should be dry, clean, and ventilated. Do not use this equipment where it could be at risk of contact with water. Ensure that this equipment is operated in an environment that meets the requirements as stated in this equipment's technical specifications, which may be found on this equipment's data sheet.

## Installation Requirements



### **WARNING:**

**Allow only qualified service personnel to install this equipment.  
The installation must conform to all local codes and regulations.**

## Equipment Placement



### **WARNING:**

**Avoid personal injury and damage to this equipment. An unstable mounting surface may cause this equipment to fall.**

To protect against equipment damage or injury to personnel, comply with the following:

- Install this equipment in a restricted access location.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other equipment (including amplifiers) that produce heat.
- Place this equipment close enough to a mains AC outlet to accommodate the length of this equipment's power cord.
- Route all power cords so that people cannot walk on, place objects on, or lean objects against them. This may pinch or damage the power cords. Pay particular attention to power cords at plugs, outlets, and the points where the power cords exit this equipment.
- Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with this equipment.
- Make sure the mounting surface or rack is stable and can support the size and weight of this equipment.
- The mounting surface or rack should be appropriately anchored according to manufacturer's specifications. Ensure this equipment is securely fastened to the mounting surface or rack where necessary to protect against damage due to any disturbance and subsequent fall.

## Ventilation

This equipment has openings for ventilation to protect it from overheating. To ensure equipment reliability and safe operation, do not block or cover any of the ventilation openings. Install the equipment in accordance with the manufacturer's instructions.

# Important Safety Instructions, Continued

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## Rack Mounting Safety Precautions

### Mechanical Loading

Make sure that the rack is placed on a stable surface. If the rack has stabilizing devices, install these stabilizing devices before mounting any equipment in the rack.



#### **WARNING:**

**Avoid personal injury and damage to this equipment. Mounting this equipment in the rack should be such that a hazardous condition is not caused due to uneven mechanical loading.**

### Reduced Airflow

When mounting this equipment in the rack, do not obstruct the cooling airflow through the rack. Be sure to mount the blanking plates to cover unused rack space. Additional components such as combiners and net strips should be mounted at the back of the rack, so that the free airflow is not restricted.



#### **CAUTION:**

**Installation of this equipment in a rack should be such that the amount of airflow required for safe operation of this equipment is not compromised.**

### Elevated Operating Ambient Temperature

Only install this equipment in a humidity- and temperature-controlled environment that meets the requirements given in this equipment's technical specifications.



#### **CAUTION:**

**If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install this equipment in an environment compatible with the manufacturer's maximum rated ambient temperature.**

## Handling Precautions

When moving a cart that contains this equipment, check for any of the following possible hazards:



#### **WARNING:**



**Avoid personal injury and damage to this equipment! Move any equipment and cart combination with care. Quick stops, excessive force, and uneven surfaces may cause this equipment and cart to overturn.**

- Use caution when moving this equipment/cart combination to avoid injury from tip-over.
- If the cart does not move easily, this condition may indicate obstructions or cables that may need to be disconnected before moving this equipment to another location.
- Avoid quick stops and starts when moving the cart.
- Check for uneven floor surfaces such as cracks or cables and cords.

# Important Safety Instructions, Continued

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## Grounding

This section provides instructions for verifying that the equipment is properly grounded.

### Safety Plugs (USA Only)

Depending on the type and application of this equipment (Safety Class I or Safety Class II), Scientific Atlanta supplies a mains cord with either a 3-terminal (grounding-type) safety plug or a 2-terminal (polarized) safety plug. The wide blade or the third terminal is provided for safety. Do not defeat the safety purpose of the grounding-type or polarized safety plug.

**To properly ground this equipment, follow these safety guidelines:**

- **Grounding-Type Plug** - For a 3-terminal plug (one terminal on this plug is a protective grounding pin), insert the plug into a grounded mains, 3-terminal outlet.

**Note:** This plug fits only one way. If this plug cannot be fully inserted into the outlet, contact an electrician to replace the obsolete 3-terminal outlet.

- **Polarized Plug** - For a 2-terminal plug (a polarized plug with one wide blade and one narrow blade), insert the plug into a polarized mains, 2-terminal outlet in which one socket is wider than the other.

**Note:** If this plug cannot be fully inserted into the outlet, try reversing the plug. If the plug still fails to fit, contact an electrician to replace the obsolete 2-terminal outlet.

### Grounding Terminal

If this equipment is equipped with an external grounding terminal, attach one end of an 18-gauge wire (or larger) to the grounding terminal; then, attach the other end of the wire to a ground, such as a grounded equipment rack.

### Safety Plugs (European Union)

- **Class I Mains Powered Equipment** - Provided with a 3-terminal AC inlet and requires connection to a 3-terminal mains supply outlet via a 3-terminal power cord for proper connection to the protective ground.


**Note:** The equipotential bonding terminal provided on some equipment is not designed to function as a protective ground connection.

- **Class II Mains Powered Equipment** - Provided with a 2-terminal AC inlet that may be connected by a 2-terminal power cord to the mains supply outlet. No connection to the protective ground is required as this class of equipment is provided with double or reinforced and/or supplementary insulation in addition to the basic insulation provided in Class I equipment.

**Note:** Class II equipment, which is subject to EN 50083-1, is provided with a chassis mounted equipotential bonding terminal. See the section titled Equipotential Bonding for connection instructions.

## Equipotential Bonding

If this equipment is equipped with an external chassis terminal marked with the IEC 60417-

5020 chassis icon (  ), the installer should refer to CENELEC standard EN 50083-1 or IEC standard IEC 60728-11 for correct equipotential bonding connection instructions.

# Important Safety Instructions, Continued

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## AC Power

**Important:** If this equipment is a Class I equipment, it must be grounded.

- If this equipment plugs into an outlet, the outlet must be near this equipment, and must be easily accessible.
- Connect this equipment only to the power sources that are identified on the equipment-rating label normally located close to the power inlet connector(s).
- If this equipment has two power sources be sure to disconnect all power sources before working on this equipment.
- If this equipment **does not** have a main power switch, the power cord connector serves as the disconnect device.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.
- Unplug this equipment when unused for long periods of time.

## Connection to -48 V DC/-60 V DC Power Sources

If this equipment is DC powered, refer to the specific installation instructions in this manual or in companion manuals in this series for information on connecting this equipment to nominal -48 V DC/-60 V DC power sources.

## Circuit Overload

Know the effects of circuit overloading before connecting this equipment to the power supply.



### CAUTION:

Consider the connection of this equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Refer to the information on the equipment-rating label when addressing this concern.

## General Servicing Precautions



### WARNING:

Avoid electric shock! Opening or removing this equipment's cover may expose you to dangerous voltages.

Be aware of the following general precautions and guidelines:

- **Servicing** - Refer all servicing to qualified service personnel. Servicing is required when this equipment has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into this equipment, this equipment has been exposed to rain or moisture, does not operate normally, or has been dropped.



## Important Safety Instructions, Continued

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- **Wristwatch and Jewelry** - For personal safety and to avoid damage of this equipment during service and repair, do not wear electrically conducting objects such as a wristwatch or jewelry.
- **Lightning** - Do not work on this equipment, or connect or disconnect cables, during periods of lightning.
- **Labels** - Do not remove any warning labels. Replace damaged or illegible warning labels with new ones.
- **Covers** - Do not open the cover of this equipment and attempt service unless instructed to do so in the instructions. Refer all servicing to qualified service personnel only.
- **Moisture** - Do not allow moisture to enter this equipment.
- **Cleaning** - Use a damp cloth for cleaning.
- **Safety Checks** - After service, assemble this equipment and perform safety checks to ensure it is safe to use before putting it back into operation.

### Electrostatic Discharge

Electrostatic discharge (ESD) results from the static electricity buildup on the human body and other objects. This static discharge can degrade components and cause failures.

**Take the following precautions against electrostatic discharge:**

- Use an anti-static bench mat and a wrist strap or ankle strap designed to safely ground ESD potentials through a resistive element.
- Keep components in their anti-static packaging until installed.
- Avoid touching electronic components when installing a module.

### Fuse Replacement

**To replace a fuse, comply with the following:**

- Disconnect the power before changing fuses.
- Identify and clear the condition that caused the original fuse failure.
- Always use a fuse of the correct type and rating. The correct type and rating are indicated on this equipment.

### Lithium Battery

**For equipment with a lithium battery, observe the following rules:**

- Do not dispose of used batteries through the regular garbage collection system, but follow the local regulations. The batteries may contain substances that could be harmful to the environment.
- Replace batteries with the same or equivalent type recommended by Scientific Atlanta.
- Insert batteries correctly. There may be a risk of explosion if the batteries are incorrectly inserted.
- When disposing of this equipment, remove the batteries and dispose of them separately in accordance with local regulations.
- Do not recharge the batteries or expose them to temperatures above 100°C (212°F).

### Electromagnetic Compatibility Regulatory Requirements

This equipment meets applicable electromagnetic compatibility (EMC) regulatory requirements. EMC performance is dependent upon the use of correctly shielded cables of good quality for all external connections, except the power source, when installing this equipment.

- Ensure compliance with cable/connector specifications and associated installation instructions where given elsewhere in this manual.

## Important Safety Instructions, Continued

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### **Otherwise, comply with the following good practices:**

- Multi-conductor cables should be of single-braided, shielded type and have conductive connector bodies and backshells with cable clamps that are conductively bonded to the backshell and capable of making 360° connection to the cable shielding. Exceptions from this general rule will be clearly stated in the connector description for the excepted connector in question.
- Ethernet cables should be of single-shielded or double-shielded type.
- Coaxial cables should be of the double-braided shielded type.

## **EMC**

Where this equipment is subject to USA FCC and/or Industry Canada rules, the following statements apply:

### **FCC Statement**

This equipment has been tested and found to comply with the limits for a Class A digital device according to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### **Industry Canada - Industrie Canadienne Statement**

**Industry Canada ICES-003:** This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

**Industrie Canadienne ICES-003:** Cet appareil numérique de la Class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### **CENELEC/CISPR Statement with Respect to Class A Information Technology Equipment**

This is a Class A equipment. In a domestic environment this equipment may cause radio interference in which case the user may be required to take adequate measures.

## **Modifications**

This equipment has been designed and tested to comply with applicable safety, laser safety, and EMC regulations, codes, and standards to ensure safe operation in its intended environment. Refer to this equipment's data sheet for details about regulatory compliance approvals.

Do not make modifications to this equipment. Any changes or modifications could void the user's authority to operate this equipment.

Modifications have the potential to degrade the level of protection built into this equipment, putting people and property at risk of injury or damage. Those persons making any modifications expose themselves to the penalties arising from proven non-compliance with regulatory requirements and to civil litigation for compensation in respect of consequential damages or injury.

## **Accessories**

Use only attachments or accessories specified by the manufacturer.

# Compliance

---

## Electromagnetic Compatibility

**FCC Part 15 Subpart B:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

**CE marked:** according to EMC directive 89/336/EEC and 93/68/EEC (European standards EN 55 022, EN 55 024, EN 61000-3-2 and EN 61000-3-3).

**C-Tick marked:** according to AS/NZS CISPR 22/2002.

## Safety

**UL listed:** according to UL60950.

**cUL listed:** according to CSA C22.2 no. 60950.

**CE marked:** according to LVD directive 73/23/EEC and 93/68/EEC (European standard EN 60950).

**CB certification:** according to IEC 60950.

## Warranty and Disclaimer

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The terms "we", "us", and "our" are used to refer to Scientific-Atlanta, Inc. The term "Item" is used to refer to our products (including software) provided hereunder. We make no representations that our product is fully compatible with similarly represented equipment from other vendors due to the wide range of implementation possibilities of the applicable standards. We extend the following warranty coverage to the original purchaser only, hereafter referred to as "Purchaser". Items must be purchased from an authorized Scientific Atlanta representative or distributor.

We warrant good title to any hardware Item furnished hereunder. During the Warranty Period (as defined below) we warrant that any hardware Item manufactured by or for us will be free from material defects in workmanship and materials and under ordinary use, conform in all material respects to its published specifications current at the time the hardware Item was shipped. For a software Item licensed by us, we warrant that we have the right to grant any software Item license granted and that the software Item, as provided, shall substantially conform to its published specifications current at the time the software Item was shipped. Separately branded hardware and software Items ("Third-Party Products") are warranted solely by the applicable manufacturer or licensor as provided below. We will repair or replace, at our option, any Item (excluding Third-Party Products) returned to us by Purchaser at its expense during the Warranty Period, which fails to satisfy this Warranty, unless the failure was the result of shipping; improper installation, maintenance or use; abnormal conditions of operation; attempted modification or repair by the Purchaser; use of the Items in combination with other items; or an act of God. If we elect to replace an Item, any duties, taxes, or expenses related to the importation of the replacement Item shall be at Purchaser's expense.

The Warranty Period begins on the date the Item is originally delivered and extends for (a) twelve (12) months for a new hardware Item manufactured by or for us, (b) six (6) months for a remanufactured hardware Item that has been reworked by us and is designated by us with "RMF" in the part number, and (c) ninety (90) days for a software Item licensed by us and for parts. For Third-Party Products, we will pass through, to the extent permitted, the manufacturer's and/or licensor's warranties and Purchaser shall look solely to such manufacturer and/or licensor for warranty repair. For any hardware Item that is returned to us during the Warranty Period and which is repaired or replaced by us, the Warranty Period for such repaired or replaced hardware Item shall be the longer of (i) the remainder of the Warranty Period for the hardware Item, or (ii) ninety (90) days after repair or replacement of such hardware Item by us.

## Warranty and Disclaimer, Continued

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If the Purchaser returns an Item to us that is not defective under the Warranty or for which the Warranty Period has expired, we will perform diagnostic tests on the Item and repair the Item if it is defective. In such instances, we will be entitled to charge the Purchaser reasonable charges for such diagnostic testing and/or repair work.



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# About This Manual

---

## Objective

This manual describes how to install, use and maintain the Encoder Model D9032.

**Note: The manual describes all available options for the D9032 Encoder. Your D9032 Encoder may only have some of the features described in this manual.**

## Audience

The audience of this manual includes **users (operators)** and **service personnel** who are responsible for the installation, operation and service of the D9032 Encoder. For further information about the definition of operator and service personnel, see also the section about **Service Personnel** and **Users and Operators** in **Terminology**, page x.

## Required Knowledge

To use this documentation, the user should have a basic knowledge of the technology used in relation to this product. Service personnel should have additional skills and be familiar with cabling, electronic circuitry, and wiring practices.

This manual is intended for operators who are responsible for the configuration, remote operation and maintenance of the D9032 Encoder. The operator is required to have a basic knowledge of the ROSA™ management system but is not necessarily familiar with tasks, task relationships, task commands or other drivers.

## About This Manual, Continued

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### Related Documentation

Further helpful information is available in the following documents:

<b>Title</b>	<b>Part No.</b>
<i>ROSA™ 3.0 Client, User Manual</i>	6984888
<i>ROSA™ 3.0 Single User, User Manual</i>	6984882
<i>ROSA™ Element Manager Installation and Operation Guide</i>	4006813
<i>ROSA™ Element Manager - User's Guide</i>	4005743
<i>COPERNICUS™ MKIII - Element Manager, User manual</i>	6985110
<i>COPERNICUS MKIII - Element Manager - User Manual</i>	6985110
<i>COPERNICUS MKIV User's Guide</i>	4005590
<i>Digital Headend Backup, Task Driver for ROSA 3.0, User's Guide</i>	6985066
<i>Digital Content Manager (DCM) Model D9900 – System Guide</i>	4011745
<i>Digital Content Manager (DCM) Model D9900 – Configuration Guide. Electronic manual, accessible via embedded user interface</i>	4011746
<i>COPERNICUS MKIV System G4 User's Guide</i>	4010960
<i>Multi Encoder Manager, Application Layer, User manual</i>	4013152
<i>Regulus™, Statistical Multiplex Controller User and Service manual</i>	4006277

### Product Versions

This user manual complies with the following software versions:

- D9032 Encoder embedded software version 2.10
- ROSA™ management system version 3.0 build 8 or greater
- SNMP protocol driver version 3.0.20
- D9032 Encoder device driver version 3.0.4

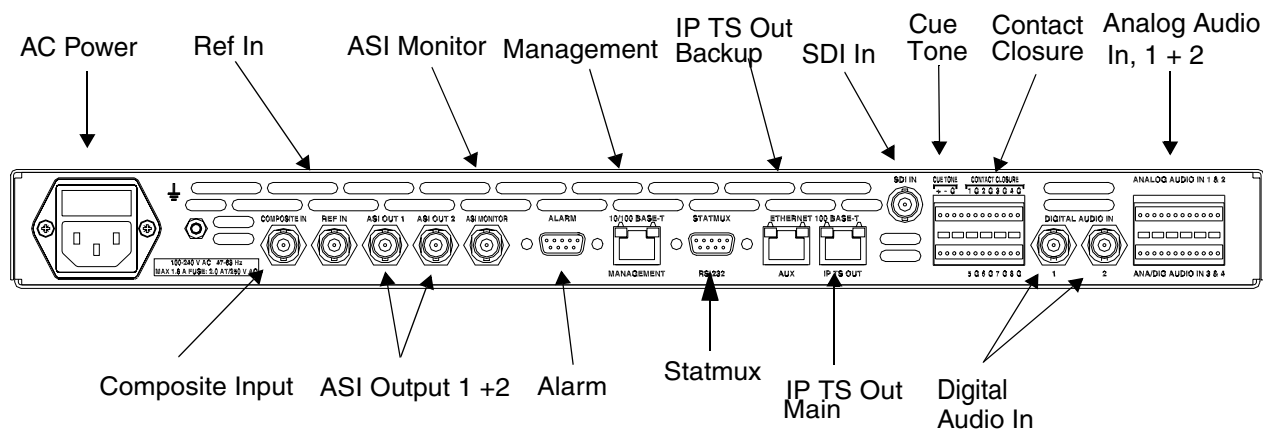
# Chapter 1

## Quick Setup - Read Me First!

### Connecting the Units

#### Electrical Connection

Proceed as follows to connect the units:



04-032

1. Connect the video input signal to the SDI IN and/or COMPOSITE IN connector.  
For further information, see **Connecting the Video and Reference Signal Inputs**, page 3-11.
2. If relevant, connect the reference input signal to the REF IN connector. For further information, see **To Connect the Reference Input**, page 3-11.
3. Connect the audio input signals for channels 1 and 2 to the DIGITAL AUDIO IN (2 BNC connectors) or Analog Audio IN 1&2.  
Use a high-quality shielded balanced audio cable for the analog inputs or a single-ended cable for the digital inputs. For further information, see **Connecting the Audio Inputs**, page 3-12.
4. Connect the statmux interface connector of each of the D9032 Encoders to one of the 16 statmux channel connectors of the Regulus Controller.  
Use a one-to-one RS-232 cable. For further information, see **Connecting the Statmux Interface**, page 3-17.
5. If relevant, connect the audio input signals for channels 3 and 4 to the terminal block connector labelled ANA/DIG AUDIO IN 3 & 4. For further information, see **Connecting the Audio Inputs**, page 3-12.
6. If relevant, connect the cable from the external alarm system to the ALARM connector.  
For further information, see **Connecting to the Contact Closure or Cue Tone Interfaces**, page 3-16.

## Connecting the Units, Continued

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7. If relevant, connect the external contact closure equipment or cue tone equipment to the contact closure respectively cue tone interface of the D9032 Encoder. For further information, see **Connecting to the Contact Closure or Cue Tone Interfaces**, page 3-16.
8. Connect the ETHERNET 10/100 BASE-T MANAGEMENT connector of the D9032 Encoders to the Ethernet LAN of the ROSA management system or to the Ethernet for local setup via the embedded user interface.  
Use a shielded Cat. 5 (or better) ethernet cable. For further information, see **Connecting the Ethernet Management Interface**, page 3-19.
9. If relevant, connect the output signals from the D9032 Encoder connectors ASI OUT 1 and/or ASI OUT2 to the ASI input connectors of the equipment after the D9032 Encoder.  
The equipment after the D9032 Encoder could be a Transport Stream Multiplexer such as the D9600 Re-multiplexer and Transport Stream Processor.
10. If relevant, connect the output signals from the D9032 Encoder connectors ASI MONITOR to an ASI monitor decoder.
11. If relevant, connect the output signals from the D9032 Encoder connectors IP TS OUT and Aux to an IP Router or switch.
12. Use a shielded Cat. 5 (or better) ethernet cable. For further information, see **Connecting the IP TS Output**, page 3-21. Connect the power sources of all the units.  
For further information, see the specific product manuals in question. When connecting the power source to the D9032 Encoder it takes less than 90 seconds for the unit to initialize. The front panel display shows the startup display.



# Front Panel Setup

---

## Setting Up the IP Parameters of the D9032 Encoder

Always verify that the IP parameters of the D9032 Encoder are correct before you try to control the unit for the first time from the ROSA management system. Also do as follows when a D9032 Encoder is added to or reinserted in the installation.

Proceed as follows to set the IP settings of the D9032 Encoder, and if necessary change them:

1. Press the MENU key on the front panel of the D9032 Encoder.<sup>1)</sup>  
The MENU key toggles between the start up display and the main menu.
2. From the main menu press the RIGHT arrow key 4 times to navigate to the system menu, and press SELECT. You have now entered the system menu.
3. From the system menu press the RIGHT arrow once and press SELECT. You have now entered the IP menu.
4. Go to the wanted menu item and press the SELECT.  
You use the right and left arrow keys to navigate to the wanted menu item.
5. If necessary change the value.  
Use the right arrow key to navigate to the digit to change and press one of the numeric keys to enter a value. Press the SELECT key to store the entered value(s).
6. If necessary, change the other IP parameters as described in steps 3 and 4 above.
7. Press the UP arrow to leave the IP menu.

**Note:** When you leave the IP menu by pressing the UP arrow key, the IP, Mask and Gateway parameters are validated against each other and stored. Any inconsistencies will be shown in the display.

**Important:** For the changes to take effect you must reset the D9032 Encoder after you have finished setting or changing the IP address, subnet mask and default gateway. Proceed as follows to reset the D9032 Encoder.

8. From the main menu press the RIGHT arrow key 4 times to navigate to the system menu and press SELECT key. You have now entered the System menu.
9. Press the RIGHT arrow key twice to go to the Reset menu. Press SELECT twice to confirm the reset.

**Note:** The reset make take up to 90 seconds.

---

1)You can also set up the IP address of the D9032 Encoder from the GUI

# Setting up the D9032 Encoders from ROSA or Via the Web Interface

---

## To Set up and Manage the D9032 Encoders From ROSA

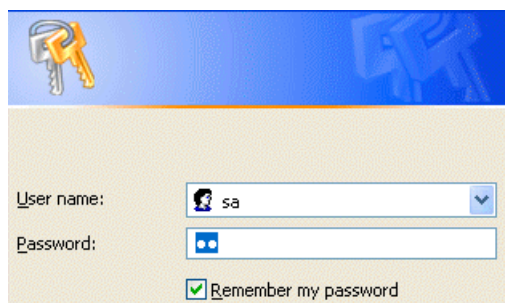
Proceed as follows to set up and manage the D9032 Encoders from ROSA:

1. From the ROSA Management system select the D9032 Encoder to set up.  
Unless changed, the default IP address of the D9032 Encoder is 150.158.230.250.
2. If you haven't previously defined a user name and password double click the D9032 Encoder icon to open the GUI.
3. If you have previously defined a user name and a password, right-click and select Properties.
4. Type user name and password.

## To Set up and Manage the D9032 Encoder Via the Embedded Web Interface

Proceed as follows to set up and manage the D9032 Encoder via the embedded Web interface:

1. Start up Microsoft Internet Explorer.  
The Internet Explorer must be version 6.0 or greater.
2. Type the IP address of the D9032 Encoder in the Address Bar and press Enter.  
Unless changed the default IP address of the D9032 Encoder is 150.158.230.250.  
Per default the Encoder has no user name and password. This means that the IP address alone is sufficient to launch the encoder GUI.  
Proceed to steps 3 and 4 below if you have created a logon.
3. Type the user name if you have previously created a logon.



**Hint:** If you have forgotten your user name and password you can reset them from the front panel user interface.

4. Type the password if you have previously created a logon.

# Chapter 2

## Introduction

### Overview

---

#### Introduction

This chapter is a general introduction to the Encoder Model D9032. It describes the most common applications and interfaces of the .

#### In This Chapter

This chapter contains the following topics:

Topic	See Page
Encoder Model D9032	2-2
Application Examples	2-6
Video Interfaces	2-8
Audio and Data Interfaces	2-9
Transport Stream Outputs	2-11
Control and Management Interfaces	2-12

# Encoder Model D9032

---

## General Description

The design of the Encoder Model D9032 is compact. The D9032 Encoder is a 1U encoder that fits into a 19-inch rack. It features one channel high-quality SDI and/or composite video processing. It is targeted at distribution and contribution applications and supports Dolby® Digital, Linear, passthrough of Dolby E, and Layer II audio encoding.

The D9032 Encoder features advanced pre-processing for optimum performance at low bit rates.

Optional PreSight<sup>Plus</sup>™ combined with the Regulus™ Statistical Multiplex Controller is one of the industry's leading solutions for bandwidth saving encoding.

The D9032 Encoder offers built-in support for SCTE35 digital program insertion (DPI), which will be used for ad-insertion applications in the digital domain.

Transport output is provided via ASI outputs as well as through IP (100 Base-T) streaming outputs.

The D9032 Encoder features Ethernet management interface and supports the open SNMP communication protocol for easy integration into the ROSA control and management system from Scientific Atlanta or into 3rd party SNMP managers.

Alternatively you may set up and control the D9032 Encoder using the embedded web interface.

## ROSA Control and Management

ROSA enables full control and monitoring functionality of the D9032 Encoder installations with redundancy switching, error reporting and remote control.

## Software Update

All software in the D9032 Encoder is stored in non-volatile memory that can be electrically programmed. New software releases for the D9032 Encoder can be downloaded via the Ethernet 10/100 Base-T Management interface.

## Encoder Model D9032, Continued

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### Software Options

The table lists the various software options which can be installed by the use of a license key. As can be seen from the list some of the options are pre-installed

Description
Pre-analysis <sup>a)</sup>
VBI <sup>a)</sup>
DPI signalling
Statistical Multiplexing
4:2:2
Noise Reduction <sup>b)</sup>
Dolby Digital Channel 1 <sup>b)</sup>
Dolby Digital Channel 2 <sup>b)</sup>
Dolby Digital Channel 3 <sup>b)c)</sup>
Dolby Digital Channel 4 <sup>b)c)</sup>
Auto-concatenation
Advanced Video Input - SDI

a. Pre-installed in all versions of the product

b. Pre-installed in all North American basic configurations

c. Pre-installed in North American basic configurations with 4 stereo pairs of audio

**Note:** All installed options are enabled at delivery.

### Video and Audio Channels

You may order the D9032 Encoder with either one SDI input, one composite input, or with both. You may order the D9032 Encoder with either two or four stereo audio channels. The audio channels may be part of the video or stand-alone audio channels.

## Encoder Model D9032, Continued

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### Encoding Bit Rates

Video and audio data can be encoded at the following bit rates and coding standards:

Input signal	Bit rate	Coding standard
Video signal	0.5 to 15 Mbit/s	MPEG-2 Main Profile at Main Level (MP@ML)
	1.5 to 50 Mbit/s	4:2:2 Profile at Main level <sup>a)</sup>
Audio signal	32 to 384 kbit/s	MPEG-1 Layer II
	56 to 640 kbit/s	Dolby Digital <sup>a)</sup>
		Dolby Digital passthrough
	2,399,968 bit/s	Linear/Dolby E

a. Requires a license

### VBI and Related Signals

The following VBI signals are supported for 625 lines PAL, 625 lines SDI, 525 lines NTSC and 525 lines SDI:

625 lines PAL	625 lines SDI	525 lines NTSC	525 lines SDI
<ul style="list-style-type: none"><li>• Transparent lines</li><li>• DVB-VBI Teletext</li><li>• Teletext B</li><li>• VPS</li><li>• VITC</li><li>• AFD WSS</li><li>• ETSI WSS</li></ul>	<ul style="list-style-type: none"><li>• Transparent lines</li><li>• DVB-VBI Teletext</li><li>• Teletext B</li><li>• VPS</li><li>• VITC</li><li>• AFD WSS</li><li>• ETSI WSS</li><li>• VII</li><li>• EDH</li></ul>	<ul style="list-style-type: none"><li>• Transparent lines</li><li>• VITC</li><li>• Closed Captions<sup>a)</sup></li></ul>	<ul style="list-style-type: none"><li>• Transparent lines</li><li>• VITC</li><li>• VII</li><li>• Closed Captions<sup>a)</sup></li><li>• EDH</li></ul>

a. The Closed Captions feature supports the transmission of Content Advisory Data (CA) from the incoming video signal to the outgoing transport stream.

### Reference Input

The D9032 Encoder provides a reference input for internal frame synchronization of the video input to an external studio reference.

## Encoder Model D9032, Continued

---

### Pre-Processing

The pre-processing includes:

- PreSight*Plus* pre-analysis with look-ahead for improved statistical multiplexing and normal fixed rate encoding. The PreSight*Plus* pre-analysis option includes adaptive quantization matrices which has a positive impact on both PQR values and the subjective visual impression. The pre-analysis includes a feature to dynamically change MPEG-2 quantization matrices and the possibility to enable 3:2 pulldown inversion for 525 lines material.
- PreSight*Plus* noise reduction option (adaptive “motion-compensated” temporal filter, and adaptive low-pass spatial filter.)
- Dynamic/variable GOP, forced I to P and P to I frames.
- Horizontal luminance and chrominance low-pass filters.

The PreSight*Plus* video noise reduction removes noise and details that stress the encoder at low bit rates. It is possible to adjust the filter manually during operation without service interruption, or to set the filter to adjust automatically to the encoding complexity of the video contents.

The PreSight*Plus* video noise reduction and pre-analysis features are options that may be ordered with the D9032 Encoder or added later.

### Sub-sampling

The D9032 Encoder supports subsampling. Sub-sampling decreases the resolution of the source material in order to lower the amount of data to be encoded.

### Transport Stream

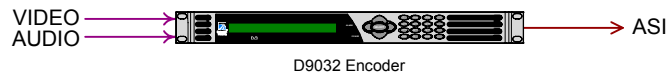
The encoded data, carrying the video and audio signals, is internally multiplexed into the MPEG-2 and DVB compliant transport stream when the D9032 Encoder is used in a stand-alone or ROSA controlled application. The three ASI outputs always carry the transport stream (TS).

# Application Examples

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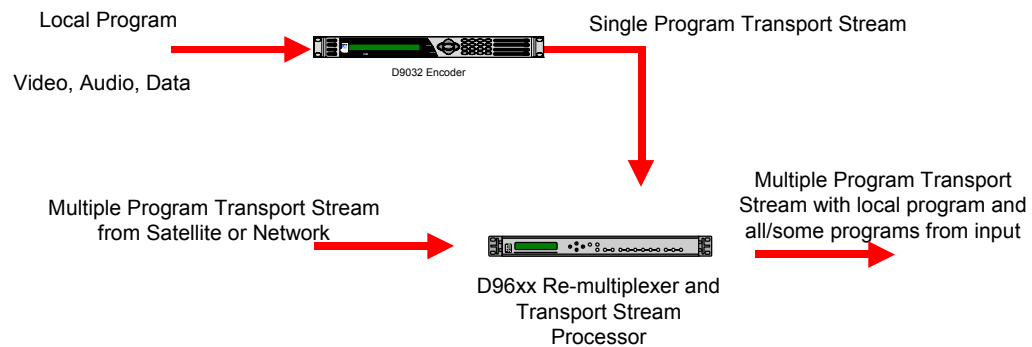
## Single Channel Encoding for Distribution

The D9032 Encoder can be used for single channel encoding in distribution applications, i.e. for local program encoding, or other applications, where only a few channels are needed.



## Local/Regional Encoding

Often a locally generated program needs to be added to the distribution network. This is where the D9032 Encoder comes in. A local program is encoded in the D9032 Encoder. The output from the D9032 Encoder is a single program transport stream. With for example the Continuum DVP D9600 Re-multiplexer and Transport Stream Processor you can insert the locally generated program into a multi program transport stream from a satellite or a network.





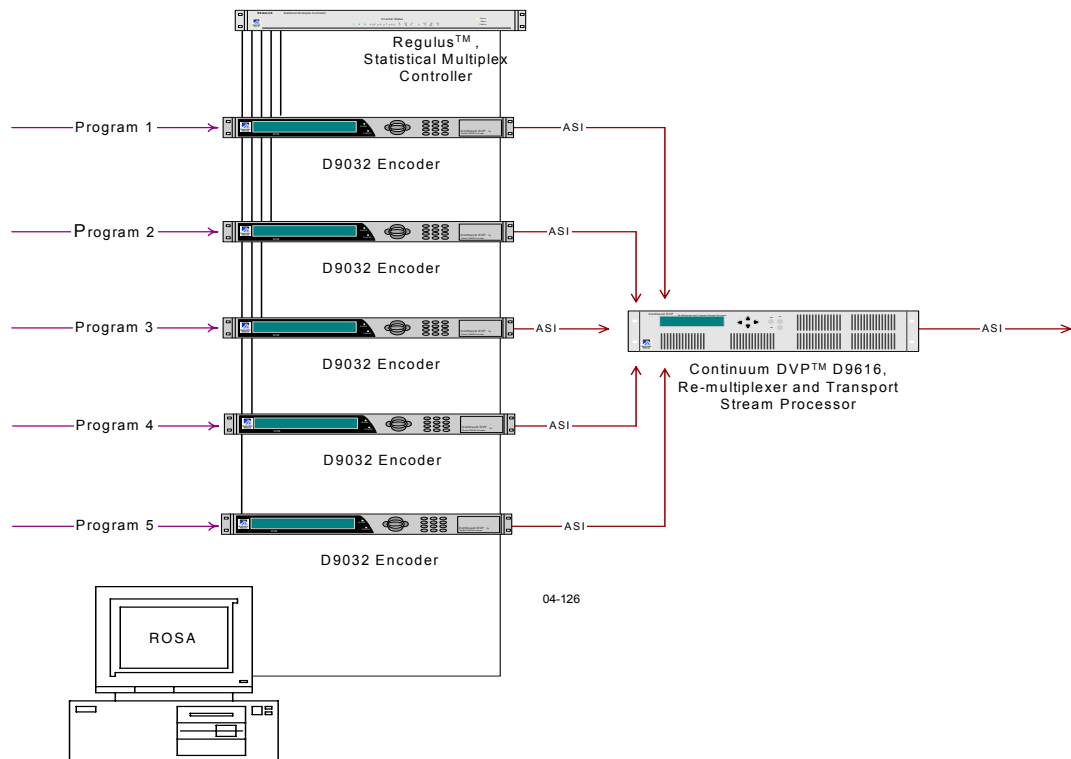
## Application Examples, Continued

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### Multichannel Statistical Encoding

The Regulus Statistical Multiplex Controller is an add-on unit for the D9032 Encoder. You may connect the Statistical Multiplex Controller to a number of encoders so that they together may participate in statistical multiplexing.

The figure below shows how five video programs are statistically multiplexed and inserted into a multi-program transport stream.



# Video Interfaces

---

## Composite Video Input

The composite video input interface accepts a 625-line PAL (B, D, G, H, I, K, M and N) or a 525-lines NTSC (M) formatted input signal.

## SDI Video Input

The SDI input interface accepts a 270 Mbit/s SDI formatted video input (D-1). The input signal is converted into the same internal component format as for the composite input option. The SDI module extracts embedded audio for further processing by an audio encoder module.

## VBI and Related Signals

The D9032 Encoder supports teletext B, DVB-VBI Teletext, Transparent Lines, VPS, WSS, VII and Closed Captioning depending on whether you have the SDI and/or composite input modules installed.

## Encoding

The video encoding includes:

- Multiple resolutions
- High quality also at very low bit rates

## AFD<sup>1)</sup>

The D9032 Encoder optionally supports the Active Format Descriptor (AFD) which makes it possible to signal to the set-top box or integrated receiver how the coded video image is best displayed when the display device does not match the coded image. Amongst others it is possible to signal the 14:9 aspect ratio. The AFD feature requires that you have installed the VBI option.

## Auto-concatenation

The D9032 Encoder optionally supports auto-concatenation of previously encoded picture material. Auto-concatenation makes it possible to align I-frames of encoded pictures with I-frames of previously encoded input material. By detecting the position of I-frames in the incoming video and making proper adjustments to the GOP, the I-frames of the encoded material can be aligned to the input. The GOP adjustments are performed seamlessly.

This feature decreases the degradation of video quality usually seen when two or more encoders are cascaded (concatenated).

---

<sup>1)</sup>In 625 lines mode with VII.

# Audio and Data Interfaces

---

## Audio Input

Four audio stereo channels can be input at the D9032 Encoder. Each of the audio inputs accept analog, digital AES/EBU or AES-3id input. Audio channels 1 and 2 (i.e. on-board audio) are only able to support S/PDIF and not AES/EBU. You can assign the encoded audio channels, in multiples of two, to the video program or to independent audio only programs.

## Digital Audio Interface

The audio input interface accepts a digital input, formatted as an AES/EBU encoded signal. Left and right channel samples are extracted from the input and synchronized to the video signal.

## Analog Audio Interface

The audio input interface features balanced left and right analog inputs. For each analog audio input you can set the input impedance and the clipping level.

## Embedded Audio

The audio input interface can be configured to accept an input of embedded audio from the SDI video input interface.

## Audio Encoding Formats

The supported audio encoding formats are MPEG-1 layer II, Dolby Digital, linear audio, and passthrough of Dolby Digital.

## Layer II Encoding

The audio inputs may be encoded in the following ways:

- a stereo program
- a joint stereo program
- two independent mono programs
- Dual channel

You can set the sampling frequency for the digitizing process to one of the following values:

- 32 kHz
- 44.1 kHz
- 48 kHz.

For audio attached to the video the D9032 Encoder locks the audio sampling frequency to the video. For AES/EBU digital input signals, the D9032 Encoder automatically adapts the incoming rate by using sample rate conversion.

## Audio and Data Interfaces, Continued

---

### Dolby Digital Encoding

The audio inputs may be encoded in the following ways:

- Dual Mono 1+1
- Stereo 2/0
- Mono 1/0

You can set the sampling frequency for the digitizing process to one of the following values:

- 32 kHz
- 44.1 kHz
- 48 kHz.

The D9032 Encoder locks the audio sampling frequency to the video. For AES/EBU digital input signals, the D9032 Encoder automatically adapts the incoming rate by using sample rate conversion.

### Dolby Digital Passthrough

The D9032 Encoder supports passthrough of up to four pre-encoded Dolby Digital stereo channels.

### Linear Audio and Dolby E Passthrough

The D9032 Encoder supports passthrough of up to 8 pre-encoded Dolby E channels. The D9032 Encoder also supports Linear audio.

### Audio Only

The D9032 Encoder supports four mono or two stereo audio-only programs. One or more audio sources can be combined to make up a program.

## Transport Stream Outputs

---

### DVB-ASI Transport Stream Output

The D9032 Encoder has three DVB-ASI outputs. These outputs can be used as an input for e.g. a satellite modem or a multiplexer. One of the outputs is an ASI monitor output for monitoring of the outgoing data stream. Unlike the two other ASI outputs the monitor output cannot be muted.

The outputs support SI generation with standard tables compliant to MPEG-2 and DVB.

### IP Transport Stream Output

The D9032 Encoder has two IP TS outputs. These outputs can be used as inputs to IP networks.

The output rate follows the ASI output rate.

# Control and Management Interfaces

---

## Embedded Web Interface

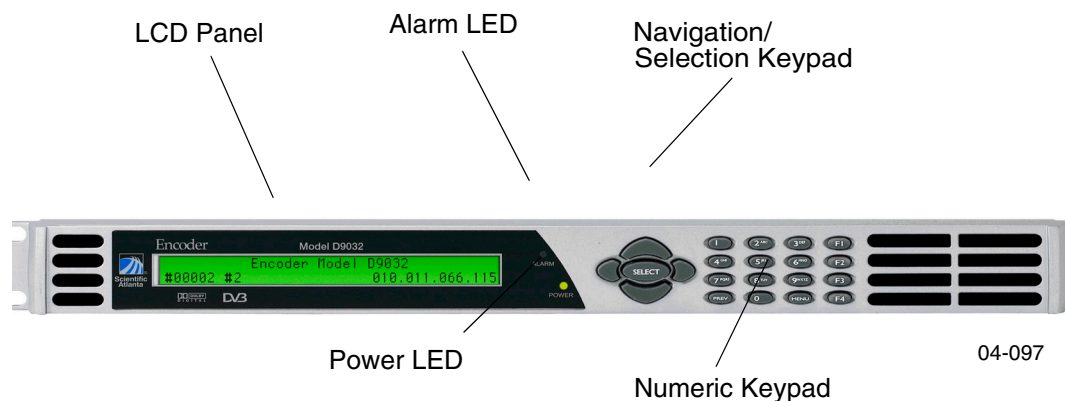
The embedded Web Interface enables you to set up and control the D9032 Encoder using the Ethernet management interface.

## ROSA Management

The ROSA/COPERNICUS system is a multi-server/multi-client based system enabling you to set up and manage a whole network of encoders. In the ROSA Single-User system the server and client is located on the same PC. Consequently it has only one simultaneous user. ROSA enables control and monitoring functionality of the D9032 Encoder installations with redundancy switching, error reporting and remote control.

## Front Panel Control

The following drawing shows the front panel with its different sections.



## Ethernet

The main control interface for the D9032 Encoder is the 10/100 BaseT Ethernet interface.

You can set up and control the D9032 Encoder via the Ethernet connection using SNMP and a management system - for example; the ROSA control and management system.

From ROSA you can update the D9032 Encoder software using FTP (File Transfer Protocol).

A MIB file is included in the delivery from Scientific Atlanta for the D9032 Encoder to support 3<sup>rd</sup> party SNMP managers.

## Control and Management Interfaces, Continued

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### Alarm Relay Interface

During operation the condition of the D9032 Encoder can be monitored by three relay contact outputs, accessible from the Alarm connector on the rear panel of the D9032 Encoder. Furthermore, the alarm status is signalled by Alarm LEDs on the front of the D9032 Encoder and by messages sent via the management system.

### Contact Closure and Cue Tone Interfaces

The contact closure and cue tone interfaces are used for Digital Program Insertion (DPI). DPI allows for the insertion of advertisements into program content in the digital domain. The supported DPI messages are in accordance with the SCTE 35 specification.

### Redundancy

The D9032 Encoder driver software supplied with the ROSA/COPERNICUS management system supports the necessary functions for backup, using the “DHB task” product. For further information, see *DHB Task, ROSA Digital Headend Backup Task, User Manual 6985066*.

Also the ROSA Element Manager is capable of backing up D9032 Encoders. For further information, see *ROSA - Element Manager - User's Guide, part number 64005743*.





# Chapter 3

## Installation

### Overview

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#### Introduction

This chapter describes how to install the Encoder Model D9032. Before installing the D9032 Encoder, read all safety precautions and guidelines thoroughly.

#### Qualified Personnel

Only appropriately qualified and trained personnel should attempt to install, operate or maintain the D9032 Encoder.



#### **WARNING:**

**Allow only qualified personnel to install this product. Otherwise, personal injury or equipment damage may occur.**

#### In This Chapter

This chapter contains the following topics:

Topic	See Page
<b>Section A - Rack Installation</b>	3-3
General	3-3
Installing the D9032 Encoder	3-4
Connection of Scientific Atlanta Equipment to DC Power Sources	3-5
<b>Section B - Connector Panel</b>	3-9
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Connecting the Video and Reference Signal Inputs	3-11
Connecting the Audio Inputs	3-12
Connecting to the Contact Closure or Cue Tone Interfaces	3-16
Connecting the Statmux Interface	3-17
Connecting an External Alarm System	3-18
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Connecting the ASI Outputs and the ASI Monitor Decoder	3-20
Connecting the IP TS Output	3-21

<b>Topic</b>	<b>See Page</b>
Connecting the Aux Output	3-22

## Section A - Rack Installation

### General

---

#### Power Connection

As Scientific Atlanta units are designed for 24 hours' operation, some products do not have a power switch. In this case the mains cord and/or DC power supply cable serve(s) as the mains disconnect device.



#### **WARNING:**

**Make sure that at least one end of the power cable(s) remains easily accessible for unplugging, if you need to switch off the unit. For example: Ensure that the socket outlet is installed near the product.**

# Installing the D9032 Encoder

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## Rack Mounted

The D9032 Encoder is a 1U unit with connector access at the rear panel. The D9032 Encoder is intended for mounting in a standard 19" rack.

## Cooling

The D9032 Encoder is cooled by the use of fans. The air intake is from the front panel and the air outlet is on the rear.



### CAUTION:

**The inlet air temperature must not exceed 50°C/122 °F at any time.**

## Grounding

You must ensure that the unit is properly connected to ground in order to meet safety and EMC requirements. Before any other connection is made, the unit must be connected to a protected ground terminal as described below:

- Via the three wire power cord of the AC power supply. This connection is mandatory.
- In addition, via the protective ground terminal on the rear panel of the unit. This connection provides additional protection of the equipment.

## To Mount the D9032 Encoder

To mount the D9032 Encoder in a rack do the following:

1. Mount rails in the rack to support each D9032 Encoder to be installed.  
For further information, contact your rack supplier.
2. Place the D9032 Encoder in its position in the rack.
3. Mount the D9032 Encoder securely to the rack by securing four screws in the holes in the front panel mounting flanges.
4. Make sure that air can circulate freely from the front of the D9032 Encoder.
5. Do not block the air outlet holes on the back of the D9032 Encoder.

## To Connect AC Power

To connect AC power to the D9032 Encoder do the following:

1. Connect the power cord (supplied with the D9032 Encoder) between the rear panel power receptacle and an 100 to 240 V AC power outlet.
2. Make sure that the power cable is connected to protective ground.  
See **Grounding** at the beginning of this section.

# Connection of Scientific Atlanta Equipment to DC Power Sources

---

## General

Some Scientific Atlanta products can be powered by DC power supplies.

In general two categories of DC power supply systems are considered:

- -48 V DC Nominal Voltage systems with absolute maximum values below 60 V DC (SELV).
- -48 to -60 V DC Nominal Voltage systems with absolute maximum values below 75 V DC. (NON SELV)

For the allowable nominal voltage, refer to the Ratings/Identification label on your product.

## -48 V DC Power Source

For equipment designed to be powered by a -48 V DC power source, and having a Normal Service Voltage Range not exceeding -38 to -58 V DC, the following safety warnings and guidelines apply:

- Independent units and chassis must be connected to the -48 V DC power source via the mating field wiring connector. Furthermore, the following applies:
  - Use a listed DC rated Branch Circuit protection in accordance with the wire size, and with a maximum of 15 A current. The circuit protection must be placed in the hot wire.
  - The -48 V DC power source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950, CSA C22.2 No. 60950, EN 60950 and IEC 60950 standards.
  - The -48 V DC power source must be electrically isolated from the AC source in accordance with the standard of the country where you are installing the product.
  - The wire size of the cable used to connect a product to the DC distribution module or bus bar must have the appropriate wire size to avoid overloading. We recommend a minimum of 1.5 mm<sup>2</sup> (or AWG16) for 15 A fusing.
  - Always wire the protective earth terminal of the DC power supply connector or cable.

## Connection of Scientific Atlanta Equipment to DC Power Sources, Continued

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### -48 to -60 V DC Power Source

Some Scientific Atlanta products can be equipped with a DC power supply, which accommodates both -48 V DC and -60 V DC Nominal power supply systems. (Normal Service Voltage Range not exceeding -36 V DC to -72 V DC).

For the allowable nominal voltage, refer to the Ratings/Identification label on your product.

In this case, the device is provided with a dedicated **MATE-N-LOK** type connector or an AMP type III connector.

A mating connector is provided in the accessory set of the unit.

For this category of equipment, the safety considerations for handling dangerous voltages are applicable.



#### **WARNING:**

**Use the same level of safety precautions for this equipment and power source as for the AC power source.**

For units powered by a -60 V DC Nominal power source, observe the following safety warnings and guidelines:

- Use a listed DC rated Branch Circuit protection in accordance with the wire size, and with a maximum of 15 A current. The circuit protection must be placed in the hot wire in order to protect the rack wiring and the power connector of the D9032 Encoder. We recommend a slow-blow type of fuse in order to pass the in-rush current during power-up.
- The -60 V DC power source must be electrically isolated from the Mains ACc source in accordance with the standard of the country where you are installing the product.
- The wire size of the cable used to connect a product to the DC distribution module or bus bar must have the appropriate wire size to avoid overloading. We recommend a minimum of 1.5 mm<sup>2</sup> (or AWG16) for 15 A fusing.
- Always wire the protective earth terminal of the DC power supply connector or cable.

## Connection of Scientific Atlanta Equipment to DC Power Sources, Continued

### Connection to Centralized DC Power Systems



#### WARNING:

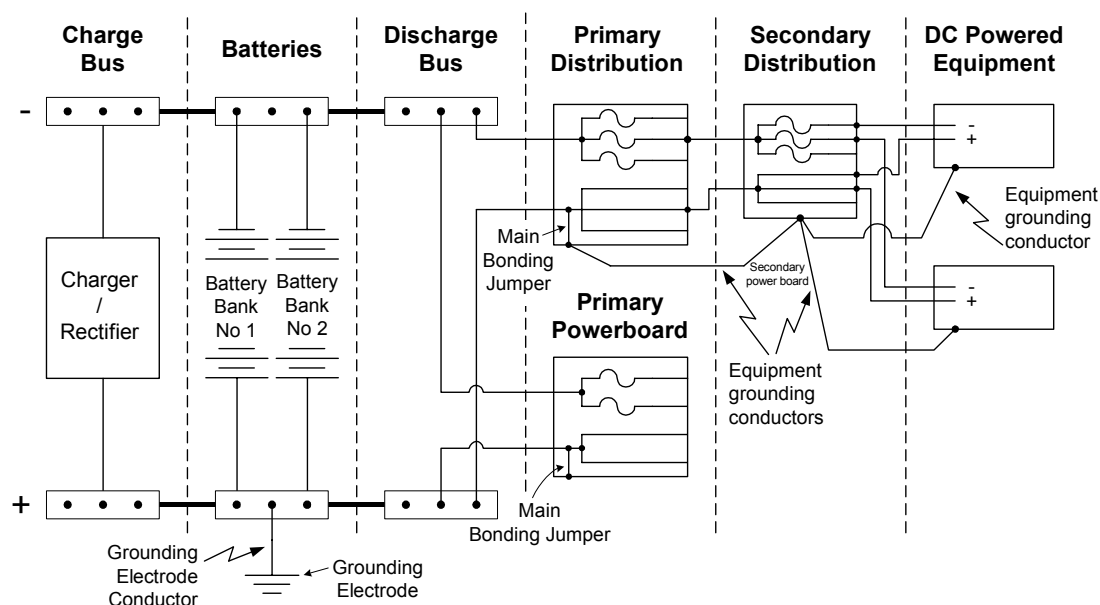
**Only units designed and rated for connection to -48 to -60 V DC Nominal power sources are suitable for connection to "Centralized DC Power Systems".**

A centralized DC power distribution system (typically -48 V DC) is a power system consisting of open batteries, charger/rectifier circuits, and primary and secondary distribution equipment intended to provide power to equipment loads. Two types of systems exist:

- **Source earthed DC power systems**, in which the connection to the earthing electrode is located at the source, and separate earthed and protective earth conductors, are provided throughout the system.
- **DC power system earthed at the equipment location**, in which the connection to the earthing electrode is located in the area where the load equipment is to be installed.

Scientific Atlanta equipment is designed for connection to Source earthed DC power systems.

A typical power distribution arrangement is shown below:



## Connection of Scientific Atlanta Equipment to DC Power Sources, Continued

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### To Connect DC Power

Check the wire size, power source and DC fuse as described above, before connecting to DC power. Connect to DC power as follows:

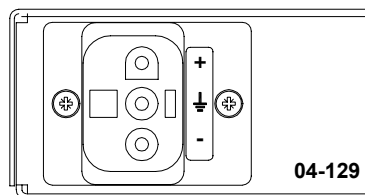
1. Connect the D9032 Encoder to the DC source through a distribution module or a bus bar being part of the rack.
2. Make sure that the power cable is connected to protective ground.

If you use a floating DC power source, the positive terminal must be connected to chassis and local ground to prevent building up of dangerous voltages.

The DC power supply input is floating with respect to chassis ground on the D9032 Encoder.

### DC Connector Pin Allocation

The following drawing shows the pin allocation for the DC connector.



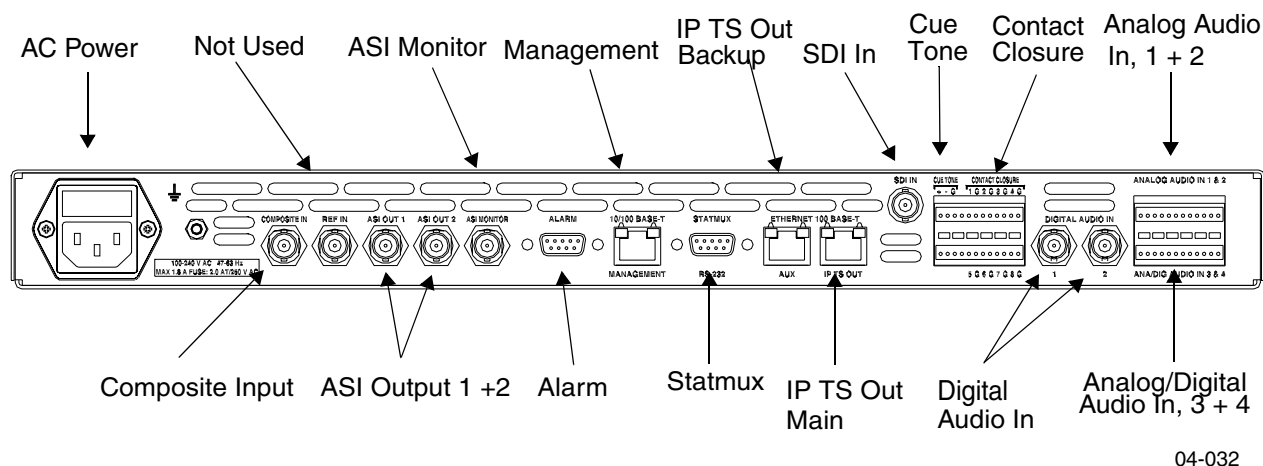


## Section B - Connector Panel

### Overview

#### D9032 Encoder Connector Panel

The following drawing shows the AC version of the connector panel.



### Connectors

The following table describes the function and type of the various connectors:

Connector	Function	Connector Number and Type
Power	AC or DC power	IEC 60320 Sheet 14 or DC connector
COMPOSITE IN	Composite input (PAL/NTSC)	BNC
REF IN	Reference input for synchronization to an external video source.	BNC
ASI OUT 1 ASI OUT 2	ASI output. Two identical outputs. Outputs can be muted.	BNC
ASI Monitor	ASI output. This output cannot be muted.	BNC
ALARM	Alarm relays	9-pin sub-D female
10/100 BASE-T MANAGEMENT	For control and management of local and remote D9032 Encoder units.	RJ45

## Overview, Continued

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Connector	Function	Connector Number and Type
STATMUX	Connection to the Statistical Multiplex Controller	9-pin sub-D female
SDI IN	SDI input	BNC
CUE TONE CONTACT CLOSURE	Cue tones for DPI triggering Contact closure for DPI triggering	Terminal block
ANA/DIG AUDIO IN 3 & 4	Analog and digital audio input for channels 3 and 4	Terminal block

**Important:** All cabling must be shielded and grounded at both ends except for Power, Alarm, and Cue Tone contact closures.

## **Section C - Connecting the Input/Output Signals**

### **Connecting the Video and Reference Signal Inputs**

---

#### **Connectors for the Video and Reference Signal Inputs**

Both the SDI, The composite video input and reference input connectors are of the BNC type and are internally terminated.

The following video and reference input signals are supported:

- 270 Mbit/s digital 525 and 625 lines SDI, or
- Analog composite PAL (B, D, G, H, I and K) and NTSC (M)
- Composite reference input

#### **To Connect to the Video Input**

Do as follows to connect to the video input:

1. Connect the video input signal to the SDI In or Composite In connector.  
Use a 75-ohm double-braided coax cable.

#### **To Connect the Reference Input**

Do as follows to connect to the reference input:

1. Connect the reference input signal to the REF IN connector.  
Use a 75-ohm double-braided coax cable.

## Connecting the Audio Inputs

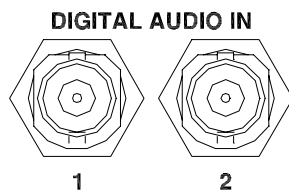
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### Connectors for the Audio Input

The basic configuration of the D9032 Encoder supports 2 stereo channels. Optionally it supports 2 additional stereo channels.

Digital audio for channels 1 and 2 is input at the BNC connector called Digital Audio In.

The following drawing shows the two BNC connectors:



The connector label Analog Audio In 1 & 2 denotes that analog audio for channels 1 and 2 is input at the top row of pins on the terminal block connector.

The connector label Ana/Dig Audio In 3 & 4 denotes that analog or digital audio for channels 3 and 4 is input at the bottom row of pins on the terminal block connector .

## Connecting the Audio Inputs, Continued

The pinout for the analog part of the terminal block connector is as follows:

Pin Number	Channel Numbering		Analog	
	Layer II	Dolby Digital	Type	Signal
1	1	1	Analog In	Left +
2				Left -
3				Shield
4	2	1	Analog In	Right +
5				Right -
6				Shield
7	3	2	Analog In	Left +
8				Left -
9				Shield
10	4	2	Analog In	Right +
11				Right -
12				Shield
13	5	3	Analog In	Left +
14				Left -
15				Shield
16	6	3	Analog	Right +
17				Right -
18				Shield
19	7	4	Analog	Left +
20				Left -
21				Shield
22	8	4	Analog	Right +
23				Right -
24				Shield

## Connecting the Audio Inputs, Continued

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The pinout for the digital part of the terminal block connector is as follows:

Pin Number	Channel Numbering		AES/EBU		AES-3id	
	Layer II	Dolby Digital	Type	Signal	Type	Signal
1 to 12			N/A		N/A	
13	5 & 6	3	Digital In	+	Digital In	Signal
14				-		Ground
15				Shield		Shield
16			Digital Out	Signal	Digital Out	Signal
17				Ground		Ground
18				Shield		Shield
19	7 & 8	4	Digital In	+	Digital In	Signal
20				-		Ground
21				Shield		Shield
22			Digital Out	Signal	Digital Out	Signal
23				Ground		Ground
24				Shield		Shield

## Connecting the Audio Inputs, Continued

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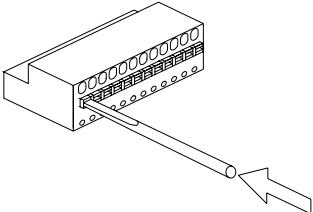
### To Connect the Audio Inputs

Do as follows to connect the audio inputs:

1. For digital channels 1 and 2 connect the audio input to the Digital Audio In connector.

**Hint:** For digital audio connections, use a coaxial cable designed for 75-ohm AES-3id.

2. For analog channels 1 and 2 do as follows:

Spring Cage Plug Connector	Step	Action
	1	Connect the analog audio input cable to the spring cage plug connector. Use a flat-blades screwdriver with a width of 2 mm and a maximum thickness of 0.4 mm to press in the spring representing the pin to be connected. Push the wire in the hole above the spring and release the spring.
	2	Connect the spring cage plug connector to the Analog Audio In 1 & 2 part of the terminal block connector.

3. For channels 3 and 4 connect the analog or digital audio input to the Ana/Dig Audio In 3 & 4 part of the terminal block connector. The input type of channels 3 and 4 is set up in the GUI.

**Note:** For digital audio connections, use a balanced cable designed for 110-ohm AES-EBU digital audio or a coaxial cable designed for 75-ohm AES-3id. Use a high-quality balanced audio cable for the analog inputs.

If you have many or heavy audio cables connected to the D9032 Encoder, you may need to suspend the cables in your rack to prevent unnecessary mechanical stress on the audio connector.

4. If relevant, use the Digital Out pins of channels 3 and/or 4 to synchronize external equipment to a reference clock. The reference clock is locked to the video.

## Connecting to the Contact Closure or Cue Tone Interfaces

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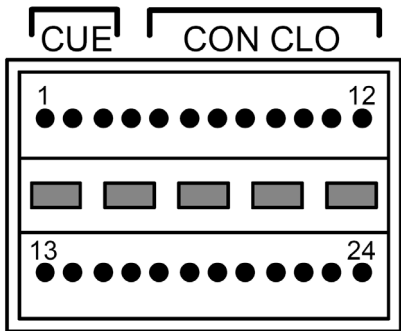
### Contact Closure and Cue Tone Connector

The D9032 Encoder has a contact closure and a cue tone interface which can be used to trigger digital program insertion (DPI). The contact closure interface has 8 inputs. The cue tone interface has two inputs.

### Pin Allocation

The connector labeled **CUE TONE CONTACT CLOSURE** is a 24 pin terminal block connector.

The following table shows the connector and the pin allocation.

Connector Drawing	Pin Number	Description	Pin Number	Description
	1	Cue Tone In +	13	NC
	2	Cue Tone In -	14	NC
	3	Ground	15	NC
	4	NC	16	INC
	5	Contact 1	17	Contact 5
	6	Ground	18	Ground
	7	Contact 2	19	Contact 6
	8	Ground	20	Ground
	9	Contact 3	21	Contact 7
	10	Ground	22	Ground
	11	Contact 4	23	Contact 8
	12	Ground	24	Ground

**Note:** Contact open = not connected (internal pull-up).  
Contact closed = connected to ground.

### To Connect to the Contact Closure Interface

Connect the external contact closure equipment to the contact closure interface. External contact closure equipment could be a Monroe DTMF decoder.

### To Connect to the Cue Tone Interface

Connect the external cue tone equipment to the cue tone interface. External cue tone equipment could be a PowerVu<sup>®</sup> D9850 Program Receiver.



## Connecting the Statmux Interface

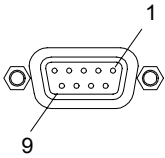
---

### Connector for the Statmux Input

The Statmux input is not applicable to the D9032 Encoder.

The D9032 Encoder has one bidirectional RS-232 data channel for connection to the Regulus Statistical Multiplex Controller.

The following table shows the female Statmux connector and the pin allocation for the RS-232 input.

Connector	Pin number	RS-232 Connector Pin allocation	Signal
	1	Not connected	RS 232-E data channel, at a bit rate of 38,400 baud Connector type: 9-pin sub-D female
	2	RxD (output)	
	3	TxD (input)	
	4	DTR (input)	
	5	GND	
	6	DSR (output)	
	7	RTS (input)	
	8	CTS (output)	
	9	Not connected	

### To Connect the Statmux Interface

Do as follows to connect to the Statmux interface:

1. Connect the one-to-one RS-232 cable to the Statmux Interface connector.  
**Note:** Use a shielded cable.
2. Connect the other end of the RS-232 cable to the Regulus Statistical Multiplex Controller.


The D9032 Encoder automatically sets up the RS-232 communication parameters when choosing statistical multiplexing.

## Connecting an External Alarm System

### Connector for an External Alarm System

The D9032 Encoder is equipped with a connector for alarm relay outputs for remote alarm signaling.

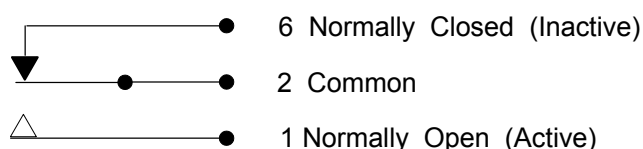
The Alarm output connector is a 9-pin Sub-D female connector. The following drawing shows the connector and the pin allocation table for the Alarm output connector.

Connector	Relay name	Function	Normally closed pin	Common pin	Normally open pin
	A	A-Alarm	6	2	1
	B	B-Alarm		8	
	C	C-Alarm		5	

1. Connect the cable from the external alarm system to the alarm connector.

### Example, Alarm Relays

The following figure shows an example of how the alarm relays work.



For example, for an A-alarm under normal operational conditions (no alarm), pin 6 is closed, that is connected to pin 2 and pin 1 is open. However, should an alarm condition occur pin 6 is open and pin 1 is closed, that is connected to pin 2. This means that the A-alarm is active and the A-alarm LED lights on the front panel.

**Note:** The A-alarm relay is always activated when the power is off or the D9032 Encoder is booting, whereas the other alarm relays maintain their status.

For example, if a B-alarm relay is inactive when the power is switched off, it stays inactive. However, if it is active when the power is switched off, it stays active.

For information about the maximum relay load, see **Alarm Interface**, page A-19.

# Connecting the Ethernet Management Interface

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## The Ethernet Interface

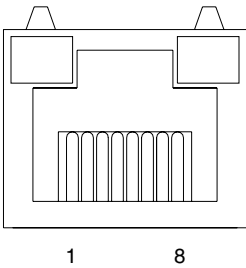
The RJ-45 interface for 10/100 BASE-T Ethernet is intended for management via the ROSA system.

**Note:** If you experience problems with the 10 BASE-T Ethernet, try changing to a 100 BASE-T connection.

**Note:** You must set up the IP address, the default gateway and the subnet mask to match the network connection. This is done through the front panel menu. For further information, see **Front Panel Setup**, page 1-3.

## Pin Allocation, Ethernet Connector

The following table shows the Ethernet connector and the pin allocation (MDI interface):

Connector	Pin	Pin allocation
 1 8 00-052	1	Tx+
	2	Tx-
	3	Rx+
	4	Not connected
	5	Not connected
	6	Rx-
	7	Not connected
	8	Not connected

## Informative Notes

For reliable Ethernet operation - to run over a maximum segment length of 100 m, the cable has to comply with the EIA/TIA Category 5 wire specifications.

## To Connect the Ethernet Interface

1. Connect a crossed RJ-45 cable between the Ethernet connector on the D9032 Encoder and the Ethernet port of your PC.

**Note:** You need a crossover cable if you want to connect the Ethernet interface of the D9032 Encoder directly to another Ethernet device without using a hub or switch.

You need to set up the IP address on both the D9032 Encoder (via the front panel display) and the ROSA driver for D9032 Encoder. For information on setting up the IP address via the front panel, see **Front Panel Setup**, page 1-3.

## Connecting the ASI Outputs and the ASI Monitor Decoder

---

### To Connect the ASI Outputs

Do as follows to connect to the ASI output:

1. Connect the output signals from the D9032 Encoder connectors ASI OUT 1 and/or ASI OUT2 to the ASI input connectors of the equipment after the D9032 Encoder.

Use a 75-ohm double-braided cable.

The equipment following the D9032 Encoder could be a Transport Stream Multiplexer such as the combination of a Continuum DVP D9600 Re-multiplexer and Transport Stream Processor.

**Note:** The two outputs are identical and can be used for back-up purposes.

2. If you want to check the ASI output signal, connect an ASI monitor to the ASI monitor connector.

**Note:** The ASI monitor output cannot be muted, but otherwise it works just like the two primary outputs.

# Connecting the IP TS Output

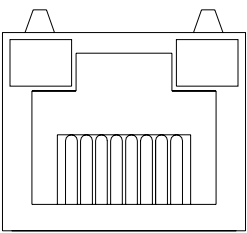
## The Ethernet Interface

The RJ-45 interface IP TS OUT for 100 BASE-T Ethernet is for output of the transport stream encapsulated in IP packets to the Main receiver.

**Note:** You must set up the IP address, the default gateway and the subnet mask in order to match the network connection. This is done through the front panel menu. For further information, see **Front Panel Setup**, page 1-3.

## Pin Allocation, Ethernet Connector

The following table shows the Ethernet connector and the pin allocation (MDI interface):

Connector	Pin	Pin allocation
 1 8 00-052	1	Tx+
	2	Tx-
	3	Rx+
	4	Not connected
	5	Not connected
	6	Rx-
	7	Not connected
	8	Not connected

## Informative Notes

For reliable Ethernet operation - to run over a maximum segment length of 100 m, the cable has to comply with the EIA/TIA Category 5 wire specifications.

## To Connect the Ethernet Interface

1. Connect a crossed RJ-45 cable between the IP TS OUT connector on the D9032 Encoder and the Ethernet port of the equipment after the D9032 Encoder.

**Note:** You need a crossover cable if you want to connect the Ethernet interface of the D9032 Encoder directly to another Ethernet device without using a hub/switch.

You need to set up the IP address on both the D9032 Encoder (via the front panel display) and the equipment after the D9032 Encoder. For information on setting up the IP address via the front panel, see **Front Panel Setup**, page 1-3.

The equipment after the D9032 Encoder could be an IP router or a switch.

# Connecting the Aux Output

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## The Ethernet Interface

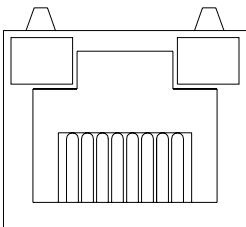
The RJ-45 interface Aux for 100 BASE-T Ethernet is for output of the transport stream encapsulated in IP packets for the backup receiver.

Alternatively you may use this connector for PCR synchronization.

**Note:** You must set up the IP address, the default gateway and the subnet mask to match the network connection. This is done through the front panel menu. For further information, see **Front Panel Setup**, page 1-3.

## Pin Allocation, Ethernet Connector

The table shows the Ethernet connector and the pin allocation (MDI interface):

Connector	Pin	Pin allocation
 1 8 00-052	1	Tx+
	2	Tx-
	3	Rx+
	4	Not connected
	5	Not connected
	6	Rx-
	7	Not connected
	8	Not connected

## Informative Notes

For reliable Ethernet operation - to run over a maximum segment length of 100 m, the cable has to comply with the EIA/TIA Category 5 wire specifications.

## To Connect the Ethernet Interface

1. Connect a crossed RJ-45 cable between the Aux connector on the D9032 Encoder and the Ethernet port of the equipment following the D9032 Encoder, i.e., a backup receiver.

**Note:** A crossover cable is required to connect the Ethernet interface of the D9032 Encoder directly to another Ethernet device without using a hub/switch. You need to set up the IP address on both the D9032 Encoder (via the front panel display) and the equipment following the D9032 Encoder. For information on setting up the IP address via the front panel, see **Front Panel Setup**, page 1-3. The equipment following the D9032 Encoder could be an IP router or a switch.

# Chapter 4

## Front Panel Operation

### Overview

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#### Introduction

This chapter describes how to set up the D9032 Encoder using the front panel keys and display.

#### In This Chapter

This chapter contains the following topics:

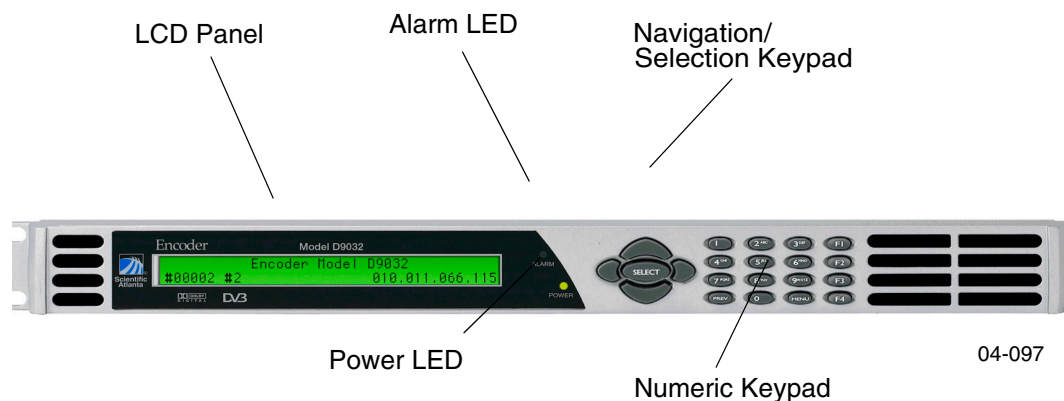
Topic	See Page
About the Front Panel	4-2
Keypad Convention	4-4
Startup Screen	4-5
Main Menu	4-6
PSI Menu	4-7
Video Menu	4-9
Audio Menu	4-16
Output Menu	4-22
System Menu	4-25
Lock Menu	4-34

# About the Front Panel

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## Introduction

The D9032 Encoder is operated using controls and indicators on the front panel. These include the numeric keypad, the Navigation/Selection keypad, the LCD, the ALARM and POWER indicators. These are shown in the following illustration:



## Keypad

The numeric keypad is used to enter alphanumeric values. The **MENU** key sets the software to the initial menu and the **PREV** key or the **UP** arrow key returns to the previous menu. The **PREV** key can also be used to cancel a numeric entry at any point during the entry sequence, and the **LEFT** arrow key allows backspacing through the entry.

## LCD

The LCD provides information on the selections available at any menu level, current settings for parameters, and certain status and alarm indications. This is a 2x40, backlit LCD panel. The top line may be status data or identifier information. It can also display optional functions available for tuning operations. The bottom line will show selections or parameter values available using the navigation/selection keypad. The items are selected by pressing the **SELECT** (center key) or **DOWN** arrow key on the navigation/selection keypad.

## Front Panel LEDs

For further information about the status signaling of the front panel LEDs, see **Front Panel LEDs**, page 6-8.



## About the Front Panel, Continued

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### Navigation/Selection Keypad







The navigation keys (**LEFT**, **RIGHT**, **UP** and **DOWN**) and the **SELECT** key on this keypad are the primary controllers. Each navigation key performs various functions, depending on the current state of the menu system (i.e., sometimes the left navigation key is used to backspace over an entry and or in some cases to move to a different menu item). Once the cursor is over the desired function, pressing the **DOWN** arrow key moves to a different menu or changes a setting. Pressing the **SELECT** key stores any entered values.

# Keypad Convention

## Overview

Throughout this manual, there are references to parts of a keypad on the front of the encoder. This is the Navigation/Selection keypad (see diagram at right), which changes its function, depending on the current state of the menu. For clarity, the following table shows which parts of this integral interface are being referenced by which term.



When you see this...	It means...	
<b>LEFT Arrow key</b>	Press the key on the left side of the Navigation/Selection Keypad.	
<b>RIGHT Arrow key</b>	Press the key on the right side of the Navigation/Selection Keypad.	
<b>UP Arrow key</b>	Press the key on the top of the Navigation/Selection Keypad.	
<b>DOWN Arrow key</b>	Press the key on the bottom of the Navigation/Selection Keypad.	
<b>SELECT key</b>	Press the key in the center of the Navigation/Selection Keypad.	
<b>PREV key</b>	Press the key on the lower left of the numeric keypad <sup>a</sup> .	
<b>MENU key</b>	Press the key on the lower right of the numeric keypad <sup>a</sup> .	
<b>Alphanumeric Entry</b>	Pressing the numeric keys 0-9 once will enter the respective digit into a data entry field.	
<b>F1, F2, F3, F4</b>	Not Implemented.	

a. Numeric keypad keys are uniform. MENU and PREV have been enlarged here for effect.

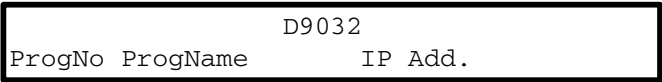
# Startup Screen

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## Structure

On power up and initialization, an identifying startup screen displays the system name, the video program number, the program name and the IP address of the unit.

The startup screen contains the following parameters:



## System Name

**Description:** The system name as set up from the software GUI. The system name is centered on the top line of the Startup screen and is not displayed on sub-pages. It is used for uniquely identifying the D9032 Encoder. The system name is also displayed in the top right corner of all software GUI pages, see **Reading the System Information or Managing the System**, page 5-121.

## ProgNo

**Description:** The video program number. The program number is set up from the PSI menu, see **Video Programs, ProgNo**, page 4-7.

## ProgName

**Description:** The video program name. The program name is set up from the GUI, see **Setting Up the Video Program**, page 5-105.

## IP Addr.

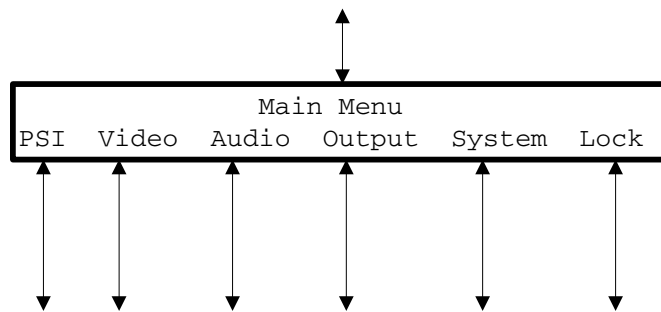
**Description:** The IP address of the D9032 Encoder. The IP address is set up from the System menu, see **IP, Management IP, IP Address**, page 4-25.

# Main Menu

---

## Structure

Operation of the Encoder Model D9032 begins at the Main menu. From the startup screen press the MENU or SELECT key to view the Main menu.



04-052

## Menu Selection

Select the desired function by moving the cursor left or right by pressing the Left or Right arrow keys. Once a selection is made by pressing the SELECT or Down arrow key, the LCD presents the second menu level for the selected function. Succeeding levels for each function are described in the following pages.

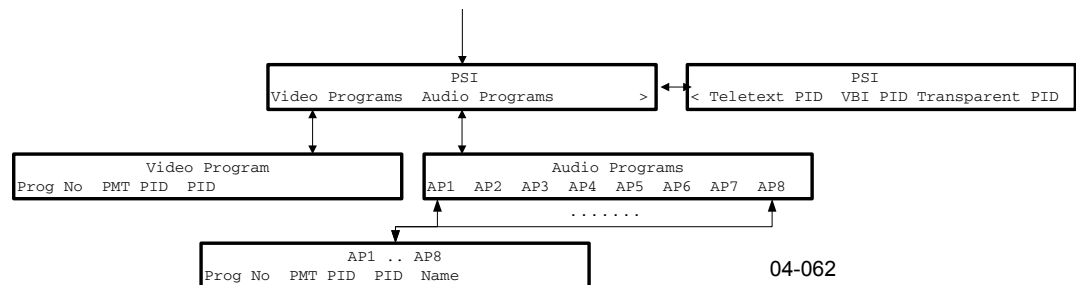
# PSI Menu

## Structure

To see the PSI Menu press the Menu key and then the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



### Video Programs, ProgNo

Parameters: A figure between 1 and 65535.

Description: Program number of the video.

### Video Programs, PMT PID

Parameters: A figure between 16 and 8190<sup>1)</sup>

Description: The PID of the Video Program Map Table (PMT). Observe that you may not use the same PID for any other program element.

### Video Programs, PID

Parameters: A figure between 16 and 8190<sup>1)</sup>.

Description: The PID of the video. Observe that you may not use the same PID for any other program element.

### APn <n = 1 to 8>, ProgNo

Parameters: A figure between 1 and 65535.

Description: The program number of the audio channel.

### APn <n = 1 to 8>, PMT PID

Parameters: A figure between 16 and 8190<sup>1)</sup>.

1)Note: the DVB tables use the PIDs from 16 to 20.

## PSI Menu, Continued

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Description: The PMT PID of the audio program. Observe that you may not use the same PID for any other program element.

### **APn <n = 1 to 8>, ProgName**

Parameters: Up to 30 Alphanumeric characters.

Description: The name of the audio program. The supported character set is ASCII.

### **Teletext PID**

Parameters: N/A. A figure between 16 and 8190.

Description: The PID of the EBU teletext. Observe that you may not use the same PID for any other program element.

### **VBI PID**

Parameters: N/A. A figure between 16 and 8190.

Description: The PID of the DVB-VBI. The DVB-VBI may contain VPS, WSS, DVB-VBI Teletext and transparent lines encoded according to the DVB-VBI specifications. Observe that you may not use the same PID for any other program element.

### **Transparent PID**

Parameters: N/A. A figure between 16 and 8190.

Description: The PID of the proprietary transparent lines. Observe that you may not use the same PID for any other program element.

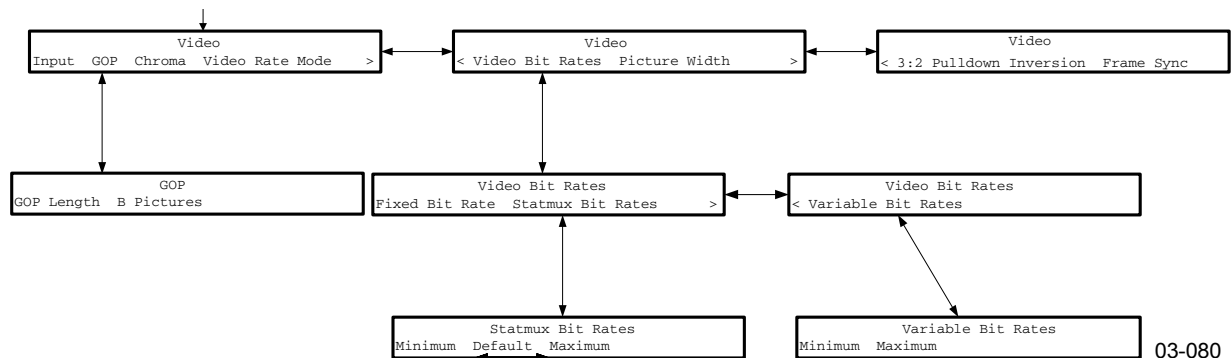
# Video Menu

## Structure

To see the Video menu from the Main menu press the RIGHT arrow key and the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



## Input

Parameters: PAL, NTSC, SDI525, SDI625, SDI AUTO, PAL-M, PAL-N.  
Description: Select the video input format of the source to encode.  
Note: If you select SDI Auto the encoder automatically selects the line type detected in the SDI signal.

## GOP, GOP Length

Parameters: A figure in the range from 1 to 32.  
Description: The GOP length and the number of B-pictures influences the picture quality and delay. For further information, see **Setting Up the Video Encoder**, page 5-24.

## GOP, B Pictures

Parameters: 0, 1 or 2.  
Description: The GOP length and the number of B-pictures influences the picture quality and delay. For further information, see **Setting Up the Video Encoder**, page 5-24.

## Video Menu, Continued

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The following table shows example settings and their meaning:

GOP Length	B Pictures	Meaning
1	0	I only
2	1	IB
4	0	IPPP
12	2	IBBPBBPBBPBB

### Chroma

Parameters: 4:2:0, 4:2:2

Description: You typically use 4:2:0 in distribution applications. 4:2:2 is sometimes used in contribution applications.

**Note:** You can only select the 4:2:2 video chroma format if you have bought, installed and enabled this option.

### Video Rate Mode

Parameters: Fixed Bit Rate, Statmux, Variable Bit Rate.

Description: Fixed bit rate encoding simply means that your video channel is encoded at a fixed rate. For further information, see **Video Bit Rates, Fixed Bit Rate**, page 4-11.

For the statmux mode, you must set up parameters controlling bit rates, quality, and the priority. You have to state these three parameters for each statmux channel. For further information, **Setting Up the Statistical Multiplexing**, page 5-38. You need a Statistical Multiplex Controller to implement statistical multiplexing. Variable means “Stand-alone Variable Bit Rate” which implies that the D9032 Encoder provides a variable bit rate output itself and in this mode there is no need for an external statistical multiplex controller. On the other hand an external transrater device is required such as the BMR from BigBand, the CherryPicker from Terayon, or the Transis™ RateCompressor, or the Digital Content Manager (DCM) from Scientific Atlanta.

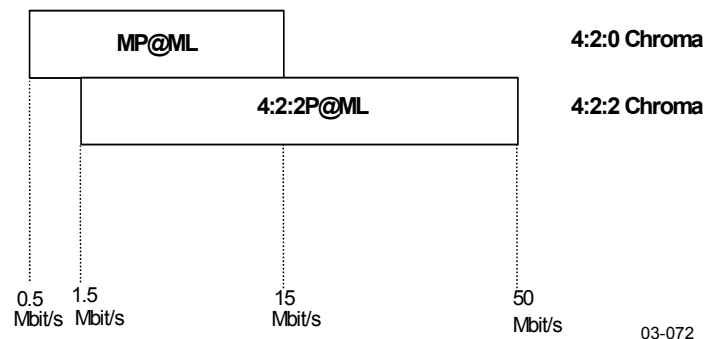


## Video Menu, Continued

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### Video Bit Rates, Fixed Bit Rate

- Parameters: 500.000 to 15.000.000 for 4:2:0 chroma format, and  
1.500.000 to 50.000.000 for 4:2:2 chroma format.
- Steps: 1 bit/s
- Description: The fixed video bit rate.  
The below figure illustrates the connection between bit rate, chroma  
and profile.



03-072

**Note:** Observe the minimum bit rates for the various GOP lengths.  
For further information, see **Setting Up the Video Encoder**,  
page 5-24.

For the relationship between bit rate, profile, number of B-pictures  
and codec delay, see **Setting Up the Video Encoder**, page 5-24.

The video bit rate must always be lower than the transport stream  
(TS) bit rate. For further information, see **Transport Stream Rates  
for the Tributaries**, page C-3.

### Video Bit Rates, Statmux Bit Rates, Minimum (N/A)

- Parameters: 500.000 to 15.000.000
- Steps: 1 bit/s
- Description: The instantaneous rate during statmux operation will not go below  
the stated minimum rate. The instantaneous rate may be higher  
than the stated minimum rate if so determined by the rate  
algorithm.

**Note:** The minimum statmux rate depends on the complexity of  
the picture and the picture resolution.

The lowest recommended minimum rate varies depending on the  
horizontal resolution and the delay mode:

## Video Menu, Continued

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Horizontal Resolution		Lowest Minimum Rate (Mbit/s)	
		Normal Delay	Low Delay
720	1.11	1.30	1.49
640	0.91	1.10	1.40
544	0.86	1.00	1.31
480	0.76	0.86	1.20
352	0.65	0.76	0.99

### Video Bit Rates, Statmux Bit Rates, Default

Parameters: 500.000 to 15.000.000

Steps: 1 bit/s

Description: The default video rate is the channel's contribution to the statmux pool when the D9032 Encoder participates in statistical multiplexing with the Statistical Multiplex Controller. During statistical multiplex operation, each D9032 Encoder that participates in statistical multiplexing will be granted capacity from the statmux pool. The sum of the default video rates for the active statmux channels equals the size of the statmux bit rate pool. The total rate of the statmux channels will not go beyond the statmux pool size, but may go lower depending on the max. quality limit.

The default video rate determines the encoding rate at which the encoder starts after power-up. Also, it determines the rate the encoder settles to during communication errors between the Statistical Multiplex Controller and the D9032 Encoder, or when the Statistical Multiplex Controller is disconnected.

The default video rate is also used to set up the TS rate budget. For information on how much the other tributaries require of the available capacity, see **Transport Stream Rates for the Tributaries**, page C-3.

The standard default setting is 5 Mbit/s.

For further information on setting up the default rates, see **Determining the Default Video Rate**, page 5-43.

## Video Menu, Continued

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### Video Bit Rates, Statmux Bit Rates, Maximum

Parameters: 1.500.000 to 15.000.000

Steps: 1 bit/s

Description: This setting is used to avoid that the rate for a channel exceeds a specified value. If you do not need rate limitation, you should leave the setting at the maximum (15 Mbit/s).

**Example:** A typical application is that you want to extract programs from the statistical multiplex bouquet and forward these programs separately. In that case, you may need to limit the maximum rate of each channel to extract so that you avoid overflow of the equipment that handles the extracted statmux programs.

**Note:** The maximum rate limit setting does not imply that the Statistical Multiplex Controller will try to go up to that rate, but simply that it will not exceed that rate. The maximum rate during operation may be lower if the statmux pool size does not allow room for it.

Stating a maximum rate limit may reduce the probability of reaching the max. quality limit.

### Video Bit Rates, Variable Bit Rate, Minimum

Parameters: 760.000 to 15.000.000.

Steps: 1 bit/s

Description: The legal range is from 0.76 to 15 Mbit/s. The instantaneous rate during operation will not go below the stated minimum rate. The instantaneous rate may be higher than the stated minimum rate if so determined by the rate algorithm. The lowest possible minimum rate depends on the complexity of the picture and the picture resolution.

### Video Bit Rates, Variable Bit Rate, Maximum

Parameters: 1.500.000 to 15.000.000.

Steps: 1 bit/s

Description: This setting is used to avoid that the rate for a channel exceeds a specified value. The legal range is from 1.5 to 15 Mbit/s. If you do not need rate limitation, you should leave the setting at the maximum (15 Mbit/s).

## Video Menu, Continued

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### Picture Width

Parameters: 720, 704, 640, 544, 528, 480, 352.

Description: Set the picture width to 720 (pixels) unless you have specific requirements.

The width determines the number of horizontal pixels in the coded picture independently of the input type and format. Changing the width can decrease the resolution of the source material and in this way lower the amount of data to be encoded.

720 is the normal setting.

You should select 704 pixels if your incoming signal has a lower number of active horizontal pixels in the picture. This is often sufficient for PAL and NTSC signals. If you observe a slight ringing on the decoder output, use 720 pixels instead.

For mainstream broadcasting applications slightly reduced resolutions, like 640, 544 or 528 pixels, will often suffice.

If your bit rate is very low, consider using 480 or even 352 pixels horizontal resolution to optimize the picture quality of a low bit rate signal.

### 3:2 Pulldown Inversion

Parameters: Off, On.

Description: Set the 3:2 Pulldown Inversion (abbreviated 3:2 PDI) to On if you are going to encode 525 lines material.

This improves the picture quality when encoding 525 lines material that originates from film.

Make sure the pre-analysis has been enabled and that auto-concatenation has been disabled. Otherwise the 3:2 PDI will not work. You disable auto-concatenation from the Video Encoder tab page.

## Video Menu, Continued

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Turn off the 3:2 PDI in the following instances:

Situation	Reason
Your decoders are not fully MPEG-2 compliant.	The decoders may not accept information on picture repetition and cannot regenerate a correct video sequence.
You need to encode all frames (in a 525 lines system).	3:2 PDI removes some of the frames and this means that you cannot provide full picture-to-picture transparency from the video input to the Transport Stream.

The 3:2 PDI feature is not applicable for 625 lines/25 Hz systems. The D9032 Encoder automatically disables 3:2 PDI if you set the D9032 Encoder to PAL or SDI625 input format.

Enabling 3:2 PDI increases the delay with 1 frame.

Do not enable or disable 3:2 PDI during live operation. The video encoding engine restarts if you enable or disable 3:2 PDI.

### Frame Sync

Parameters: Off, Internal Clock, External Reference.

Description: Select External Reference if you want to synchronize your video to the reference signal on the reference input.

If you set the frame synchronization to Off the video encoding is locked to the video input. Internal Clock means that the video is synchronized to the internal 27 MHz reference clock.

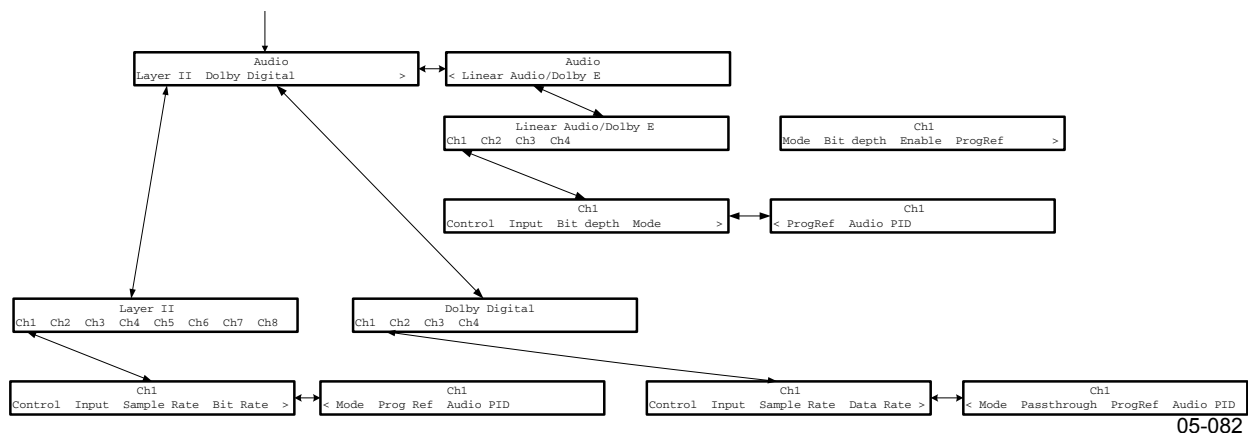
# Audio Menu

## Structure

To see the Audio menu from the Main menu press the RIGHT arrow key twice and the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



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## Audio

Parameters: Layer II, Dolby Digital or Linear/Dolby-E.

Description: The D9032 Encoder can encode the audio input according to the Layer II or Dolby Digital standards. It also accepts a pre-encoded Dolby Digital or Dolby-E input.

### Layer II, <ch 1 to ch 8>

Parameters: Ch1, Ch2, Ch3, Ch4, Ch5, Ch6, Ch7, or Ch8.

Description: Select the channel you want to set up. Layer II channels Ch2, Ch4, Ch6 and Ch8 are only used in Single Mono mode, and in this case they represent the right channels. In Single Mono mode, channels Ch1, Ch3, Ch5 and Ch7 represent the left mono channels.

In Stereo, Joint Stereo and Dual Channel mode you only use channels Ch1, Ch3, Ch5 and Ch7.

### Layer II, <ch 1 to ch 8>, Control

Parameters: Enable, Disable.

Description: Enable or disable the channel in question.

## Audio Menu, Continued

---

### Layer II, <ch 1 to ch 8>, Input

Parameters: Analog, Digital, Embedded.

Description: The D9032 Encoder inputs the signal from the Analog/Digital input connector in the selected format. If you select **Embedded** the D9032 Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

### Layer II, <ch 1 to ch 8>Sample Rate

Parameters: 32000 Hz, 44100 Hz, 48000 Hz.

Description: The sample rate of the input signal.

It is not recommended to increase the encoding sample rate above the input sample rate.

For the lowest audio bit rates, use the lowest sample rate for better quality.

### Layer II, <ch 1 to ch 8>, Bit Rate

Parameters: 32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 or 384 (kbit/s).

Description: The bit rate must be  $\leq 192$  kbit/s if you set the Layer II mode to Mono.

If you use Joint stereo, it is recommended that you use bit rates up to 128 or 192 kbit/s. Joint Stereo with a bit rate of 256 or 384 kbit/s reduces sound quality compared to stereo.

### Layer II, <ch 1 to ch 8> Mode

Parameters: Stereo, Joint Stereo, Dual Channel, Single Mono.

Description: Do not use Joint stereo audio coding if you want to transfer matrixed sound (i.e. Stereo Surround sound). Use Stereo instead. If you use Joint stereo, part of the phase information essential for re-creating the surround channel information disappears.

**Note:** If you select the Single Mono mode you get the setup which has been enabled in the ROSA GUI.

### Layer II, <ch 1 to ch 8>, ProgRef

Parameters: Video, Audio1, Audio2, Audio3, Audio4, Audio5, Audio6, Audio7, Audio8.

Description: When you select **Video**, the audio in question will be part of the video program. When you select one of the audios you define that audio channel to be part of the selected audio program. In this manner, you can set up several audio channels to be part of the same audio program.

## Audio Menu, Continued

---

### Layer II, <ch 1 to ch 8>, Audio PID

- Parameters: A figure between 16 to 8190<sup>2)</sup>.
- Description: You may not use the same PID for any other program element.

### Dolby Digital, <ch 1 to ch 4>

- Parameters: Ch1, Ch2, Ch3, Ch4.
- Description: Select the channel you want to set up.

### Dolby Digital, <ch 1 to ch 4>, Control

- Parameters: Enable, Disable
- Description: Enable or disable the channel in question.

### Dolby Digital, <ch 1 to ch 4>, Input

- Parameters: Analog, Digital, Embedded.
- Description: The D9032 Encoder inputs the signal from the Analog/Digital input connector in the selected format. If you select **Embedded** the D9032 Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

### Dolby Digital, <ch 1 to ch 4>Sample Rate

- Parameters: 32000 Hz, 44100 Hz, 48000 Hz.
- Description: The sample rate of the input signal.
- It is not recommended to increase the encoding sample rate above the input sample rate.
- For the lowest audio bit rates, use the lowest sample rate for better quality.

### Dolby Digital, <ch 1 to ch 4>, Data Rate

- Note: This menu will only be displayed if you have installed the Dolby Digital option.
- Parameters: 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640 (kbit/s).
- Description: Settings for the compressed bit rate are available from 56 to 640 kbit/s. Increasing the number in this field increases the audio bandwidth at the encoder, improving the quality of the audio transmitted by the encoder.
- The default is 192 kbit/s.

<sup>2)</sup>Note that the DVB tables use the PIDs from 16 to 20.



## Audio Menu, Continued

---

Use the following bit rate ranges for the selected audio mode.

Mode	Bit Rate Range
Stereo 2/0	96 – 640 kbit/s
Dual Mono 1+1	112 – 640 kbit/s
Mono (Center) 1/0	56 – 640 kbit/s

### Dolby Digital, <ch 1 to ch 4>, Mode

**Note:** This menu will only be displayed if you have installed the Dolby Digital option.

Parameters: Stereo 2/0, Dual Mono 1+1, Mono 1/0

Description: Use this setting to select the number of channels and the channel format within the encoded bit stream.

The three available audio encoding modes are listed below. The mode definition uses two numbers ( $m/n$ ), with  $m$  indicating the number of front channels, and  $n$  indicating the number of rear (surround) channels.

Mode	Channel Format
Stereo 2/0	Left, Right
Dual Mono 1+1	(Left – Channel 1, Right – Channel 2)
Mono (Center) 1/0	Center

The default setting is Stereo (2/0).

If the mode is set to Dual Mono (1+1), then two completely independent program channels, referenced as Mono Channel 1 and Mono Channel 2, are encoded into the bit stream. **Dual-mono mode is primarily intended for professional applications. Dual-mono cannot be expected to work with consumer Dolby Digital (AC-3) decoders.**

### Dolby Digital, <ch 1 to ch 4>, Passthrough

Parameters: Enable, Disable.

Description: From this menu you enable or disable passthrough of Dolby Digital. The D9032 Encoder accepts a pre-encoded Dolby Digital audio input. We recommend that you set the maximum data rate to that of the external Dolby Encoder. If the data rate of the Dolby Encoder is lower than the setting in the D9032 Encoder the audio will be passed through and only the actual bits in the data stream will be used.

The default video rate is 640 kbit/s.

## Audio Menu, Continued

---

The external Dolby Encoder must be locked to the clock of the D9032 Encoder. This can be achieved by connecting the Digital Output of the audio connector to the external encoder or by means of external equipment if audio option is not installed.<sup>3)</sup>

### Dolby Digital, <ch 1 to ch 4>, ProgRef

Parameters: Video, Audio1, Audio2, Audio3, Audio4, Audio5, Audio6, Audio7, Audio8.

Description: When you select **Video** the audio in question will be part of the video program. When you select one of the audios you define that audio channel to be part of the selected audio program. In this way you can set up several audio channels to be part of the same audio program.

### Dolby Digital, <ch 1 to ch 4>, Audio PID

Parameters: A figure between 16 to 8190<sup>4)</sup>.

Description: Observe that you may not use the same PID for any other program element.

### Linear/Dolby E, <ch 1 to ch 4>

Parameters: Ch1, Ch2, Ch3, Ch4

Description: Select the channel you want to set up.

### Linear/Dolby E, <ch 1 to ch 4>, Control

Parameters: Enable, Disable

Description: Enable or disable the channel in question.

### Linear/Dolby E, <ch 1 to ch 4>, Input

Parameters: Analog, Digital, Embedded

Description: The D9032 Encoder inputs the signal from the Analog/Digital input connector in the selected format. If you select **Embedded** the D9032 Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

### Linear/Dolby E, <ch 1 to ch 4>, Bit Depth

Parameters: 16, 20, 24

Description: The sample rate is 48 kHz. The bit depth setting is only applicable for linear mode. The bit depth is always 20 bits in Dolby E mode.

3)Note: The reference output is only present in a D9032 encoder if the additional audio option is installed.

4)Note: The DVB tables use the PIDs from 16 to 20.

## Audio Menu, Continued

---

### Linear/Dolby E, <ch 1 to ch 4>, Mode

Parameters: Linear/Dolby E

Description: Use this setting to select between Linear and Dolby E mode.

### Linear/Dolby E, <ch 1 to ch 4>, ProgRef

Parameters: Video, Audio1, Audio2, Audio3, Audio4, Audio5, Audio6, Audio7, Audio8

Description: When you select **Video** the audio in question will be part of the video program. When you select one of the audios you define that audio channel to be part of the selected audio program. In this way you can set up several audio channels to be part of the same audio program.

### Linear/Dolby E, <ch 1 to ch 4>, Audio PID

Parameters: A figure between 16 to 8190<sup>5)</sup>.

Description: Observe that you may not use the same PID for any other program element.

<sup>5)</sup>Note: The DVB tables use the PIDs from 16 to 20.

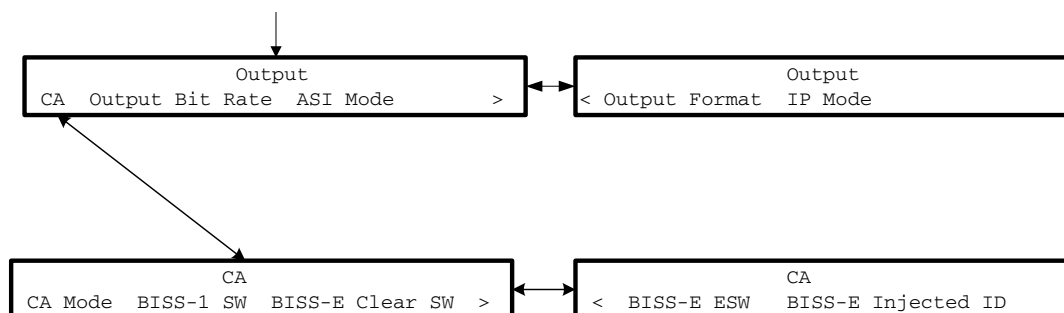
# Output Menu

## Structure

To see the Output menu from the Main menu press the RIGHT arrow key three times and the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



04-130

## CA, CA Mode

Parameters: N/A. BISS-1 SW, BISS-E, Clear SW, BISS-E ESW, BISS-E Injected ID

Description: The meaning of the various modes is as follows:

Mode	Meaning
No scrambling (BISS-0)	Scrambling is off.
BISS-1 SW	You want to scramble the transmission by using a BISS-1 session word.
BISS-E Clear SW	You want to scramble the transmission by using a clear (de-encrypted) BISS-E session word. You cannot see the session word in the display when typing or entering the menu.
BISS-E ESW	You want to scramble the transmission by using two BISS-E keys; the Encrypted Session Word (ESW) and the Injected ID (see below). You cannot see the keys when typing or entering the menu.
BISS-E Injected ID	You want to scramble the transmission by using two BISS-E keys, the Injected ID and the Encrypted Session Word (ESW). You cannot see the keys when typing or reloading.

## Output Menu, Continued

---

### Restrictions on Entering of Key Values

The D9032 Encoder will not accept changes of key values in case either of the following conditions are met:

- less than 10 seconds have elapsed since last change of a key value.
- more than 10 changes in key values have been made within the last 5 minutes

This means that only one parameter can be changed per Apply.

### CA, BISS-1 SW

Parameters: 0 to 9 and A to F.

Description: The BISS-1 session word must be in hexadecimal notation and 12 characters long. You toggle between the letters by using the Down arrow key.

### CA, BISS-E Clear SW

Parameters: 0 to 9 and A to F.

Description: The BISS-E clear session word must be in hexadecimal notation and 12 characters long. You toggle between the letters by using the Down arrow key.

### CA, BISS-E ESW

Parameters: 0 to 9 and A to F.

Description: The BISS-E encrypted session word must be in hexadecimal notation and 16 characters long. You toggle between the letters by using the Down arrow key. The BISS-E encrypted session word is used together with BISS-E Injected ID described below.

### CA, BISS-E Injected ID

Parameters: 0 to 9 and A to F.

Description: The BISS-E clear injected ID must be in hexadecimal notation and 14 characters long. You toggle between the letters by using the Down arrow key.

### Output Bit Rate

Parameters: 1.000.000 to 64.000.000.

Steps: 1 bit/s

Description: The ASI output bit rate (transport stream rate). For information about how much the various tributaries (video, audio, VBI etc.) take up of in the transport stream, see **Transport Stream Rates for the Tributaries**, page C-3.

## Output Menu, Continued

---

### ASI Mode

Parameters: Packet, Burst.

Description: Select between the 2 DVB transmission modes for ASI. In Packet mode you send a whole MPEG packet together (188/204 bytes) and have stuffing in between packets. In Burst mode you send 1 byte at a time with stuffing in between. Some non-Scientific Atlanta decoders specifically require Packet or Burst mode.

### Output Format

Parameters: 188, 204 RS Off, 204 RS On.

Description: **188** means that the Reed Solomon Error Correction algorithm is not applied on the TS output.

**204 RS OFF.** The setting means that the Reed Solomon algorithm is not applied on the output. The 16 bytes overhead are 0 bytes which may later be used for Reed Solomon error correction.

**204 RS ON** means that the Reed Solomon algorithm is applied for ASI outputs. The Reed Solomon algorithm is not applied for IP outputs.

### IP Mode

Parameters: Disable, UDP.

Description: Select UDP mode in order to enable the IP TS output.

Note: You have to use the web-based user interface or the ROSA interface to set up the MAC and IP addresses of the receiver of the IP streaming packets.

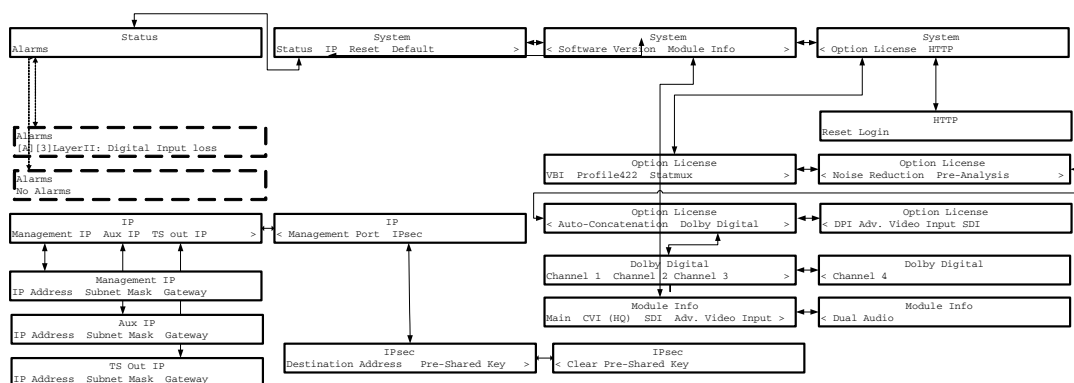
# System Menu

## Structure

To see the System menu from the Main menu press the RIGHT arrow key four times and the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



## Status, Alarms

Parameters: N/A.

Description: A list of active alarms in the system. The most recent ones are displayed first.

## IP, Management IP, IP Address

Parameters: <0 to 255> .<0 to 255> .<0 to 255> .<0 to 255>.

Description: The IP address of the management interface to the D9032 Encoder. Contact your local network administrator to obtain an IP address. Use the numeric keys to type the IP address. Press the SELECT key to store the entered values. Press the Up arrow key to leave the menu. When you leave the IP menu by pressing the Up arrow key once more the IP, Mask and Gateway parameters are validated against each other and stored. Any inconsistencies will be shown in the display.

## System Menu, Continued

---

**Important:** For the changes to take effect you must reset the D9032 Encoder after you have finished setting or changing the IP address, subnet mask and default gateway. The D9032 Encoder will display a reminder.

**Note:** The reset may take up to 90 seconds.

**Note:** The IP Address is not affected by the Default command.

### IP, Management, Subnet Mask

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.

Description: The subnet mask of the management interface to the D9032 Encoder. Setup similar to **IP, Management IP, IP Address**, page 4-25, above.

**Note:** The subnet mask is not affected by the Default command.

### IP, Management, Gateway

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>

Description: The default gateway of the management interface to D9032 Encoder. The D9032 Encoder uses this gateway to route IP traffic across the network. Setup similar to **IP, Management IP, IP Address**, page 4-25, above.

**Note:** The default gateway setting is not affected by the Default command.

**Note:** The default gateway 0.0.0.0 means that no gateway is used.

### IP, Aux IP, IP Address

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.

Description: The IP address of the Aux interface on the D9032 Encoder.

Use the numeric keys to type the IP address.

Press the SELECT key to store the entered values.

Press the Up arrow key to leave the menu.

When you leave the IP menu by pressing the Up arrow key again, the IP, Mask and Gateway parameters are validated against each other and stored. Any inconsistencies will be shown in the display.

**Important:** For the changes to take effect you must reset the D9032 Encoder after you have finished setting or changing the IP address, subnet mask and default gateway. The D9032 Encoder will display a reminder.

**Note:** The reset may take up to 90 seconds.

**Note:** The IP Address is not affected by the Default command.



## System Menu, Continued

---

### IP, Aux IP, Subnet Mask

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.

Description: The subnet mask of the Aux interface on the D9032 Encoder. Setup similar to **IP, Aux IP, IP Address**, page 4-26.

**Note:** The subnet mask is not affected by the Default command.

### IP, Aux IP, Gateway

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>

Description: The default gateway of the Aux interface on the D9032 Encoder.

The D9032 Encoder uses this gateway to route IP traffic across the network. Setup similar to **IP, Aux IP, IP Address**, page 4-26.

**Note:** The default gateway setting is not affected by the Default command.

**Note:** The default gateway 0.0.0.0 means that no gateway is used.

### IP, TS Out IP, IP Address

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.

Description: The IP address of the IP TS Out interface.

Use the numeric keys to type the IP address.

Press the SELECT key to store the entered values.

Press the Up arrow key to leave the menu.

When you leave the IP menu by pressing the UP arrow key once more the IP, Mask and Gateway parameters are validated against each other and stored. Any inconsistencies will be shown in the display.

**Important:** For the changes to take effect you must reset the D9032 Encoder after you have finished setting or changing the IP address, subnet mask and default gateway. The D9032 Encoder will display a reminder.

**Note:** The reset may take up to 90 seconds.

**Note:** The IP Address is not affected by the Default command.

### IP, TS Out IP, Subnet Mask

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.

Description: The subnet mask of the IP TS Out interface. Setup similar to **IP, TS Out IP, IP Address**, page 4-27.

**Note:** The subnet mask is not affected by the Default command.

## System Menu, Continued

---

### IP, TS Out IP, Gateway

- Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.
- Description: The default gateway of the IP TS Out interface. The D9032 Encoder uses this gateway to route IP traffic across the network. Setup similar to **IP, TS Out IP, IP Address**, page 4-27.
- Note:** The default gateway setting is not affected by the Default command.
- Note:** The default gateway 0.0.0.0 means that no gateway is used.

### Reset

- Parameters: N/A.
- Description: Resets (boots) the D9032 Encoder.  
The D9032 Encoder displays a message asking you to confirm the resetting of the unit. Press SELECT to reset and the Up arrow key or PREV to leave the menu without resetting.
- Note:** You should reset the D9032 Encoder if:
- there has been a temperature alarm causing the D9032 Encoder to disable functionality.
  - you have set or changed the IP address, subnet mask or gateway of one of the IP interfaces of the D9032 Encoder via the front panel display.
- Note:** The reset may take up to 90 seconds.

### Default

- Parameters: N/A.
- Description: The D9032 Encoder will display a message asking you to confirm the defaulting of the unit. Press SELECT to default and the Up arrow key or PREV to leave the menu without defaulting.  
Use the default settings if you have set up the D9032 Encoder with illegal and incompatible settings to get the encoder back in a functional state.
- Note:** The default may take up to 10 seconds.

### IP, Management Port

- Parameters: Management IP, TS Out IP.
- Description: Selects between the two management ports.

## System Menu, Continued

---

### IP, IPsec, Destination Address

Parameters: <0 to 255> . <0 to 255> . <0 to 255> . <0 to 255>.

Description: IP address of the destination network.

When IPsec is enabled by setting a destination address and a pre-shared key (for encryption) you won't be able to communicate with the device until you have established a secure connection between the encoder and the destination network/devices.

Use the numeric keys to type the IP address.

Press the SELECT key to store the entered values.

Press the Up arrow key to leave the menu.

**Important:** For the changes to take effect you must reset the D9032 Encoder after you have finished setting or changing the IP address. The D9032 Encoder will display a reminder.

**Note:** The reset may take up to 90 seconds.

**Note:** The IP Address is not affected by the Default command.

### IP, IPsec, Pre-Shared Key

Parameters: 16-character alphanumeric key.

Description: Password for the secure connection. When IPsec is enabled by setting a destination address and a pre-shared encryption key you won't be able to communicate with the device until you have established a secure connection between the encoder and the destination network/devices.

Use the numeric keys to type the pre-shared encryption key.

Use the down arrow to enter letters.

Press the SELECT key to store the entered values.

Press the Up arrow key to leave the menu.

**Important:** For the changes to take effect you must reset the D9032 Encoder after you have finished setting or changing the pre-shared key. The D9032 Encoder will display a reminder.

**Note:** The reset may take up to 90 seconds.

**Note:** The Pre-Shared is not affected by the Default command.

### IP, IPsec, Clear Pre-Shared Key

Parameters: N/A.

Description: Clears the Pre-Shared encryption Key.

### Software Version

Parameters: N/A.

Description: The software version of the system controller.

## System Menu, Continued

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### Module Info, Main

Parameters: N/A.  
Description: The hardware and the software part numbers of the main board.

### Module Info, CVI (HQ)

Parameters: N/A.  
Description: The hardware and the software part numbers of the high quality composite optional input module.

### Module Info, SDI

Parameters: N/A.  
Description: The hardware and the software part numbers of the SDI input module.

### Module Info, Adv. Video Input

Parameters: N/A.  
Description: The hardware and the software part numbers of the Advanced Video Input module.

### Module Info, Dual Audio

Parameters: Enabled, Disabled.  
Description: The hardware part number<sup>6)</sup> of the optional audio module. The audio module contains two stereo channels or 4 mono channels.

### Option License, VBI

Parameters: Enabled, Disabled.  
**Note:** VITC data in the incoming signal will automatically be transferred to the transport stream output independently of the VBI option.  
Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

**Note:** This option is always pre-installed and enabled at delivery.

<sup>6)</sup>The audio module has no software part number and will show N/A in the software part number field.

## System Menu, Continued

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### Option License, Profile422

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

### Option License, Statmux

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

### Option License, Noise Reduction

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

## System Menu, Continued

---

### Option License, Auto Concatenation

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

### Option License, Dolby Digital, Channel 1, Channel 2, Channel 3 or Channel 4

Parameters: Enabled, Disabled.

Description: You need an option license for the two Dolby Digital channels. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

### Option License, Adv. Video Input SDI

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

## System Menu, Continued

---

### Option License, Pre-Analysis

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Note! This option is always pre-installed and enabled at delivery.

### HTTP

Parameters: Reset Login.

Description: Use this feature if you want the reset the login for the web-based user interface.

Important: For the changes to take effect you must reset the D9032 Encoder after you have finished resetting the login.

Note: The reset may take up to 90 seconds.

### Option License, DPI

Parameters: Enabled, Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Scientific Atlanta sales representative if you want to buy an option.

# Lock Menu

---

## Structure

To see the Lock menu from the Main menu press the Right arrow key five times and then the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:

Lock  
Unlocked  
Locked

04-058

## Lock

Parameters:    Unlocked, Locked.

Description:    From this menu you may lock or unlock the front panel. When the front panel is locked you can only see settings but not change them from the front panel menus.



# Chapter 5

## Setup and Monitoring

### Overview

---

#### Control Modes

You can set up and control the D9032 Encoder by using the front panel keyboard, the embedded Web Interface, or a PC and the ROSA management system.

#### Front Panel Keyboard

The D9032 Encoder can be operated from the front panel keyboard. For further information, see **Front Panel Operation**, page 4-1.

#### Embedded Web Interface

The D9032 Encoder is delivered with an embedded web-based GUI enabling you to set and control the unit via an IP network.

#### ROSA Management

The ROSA/COPERNICUS system is a multi-server/multi-client based system enabling you to set up and manage a whole network of encoders. In the ROSA Single-User system the server and client is located on the same PC. Consequently it has only one simultaneous user. ROSA enables full control and monitoring functionality of the D9032 Encoder installations with redundancy switching, error reporting and remote control.

## Overview, Continued

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### In This Chapter

This chapter describes how to set up and monitor the D9032 Encoder using the ROSA management system or the embedded Web interface. The sections describe:

- how to install ROSA,
- how to work with the ROSA user interface,
- how to make a bit rate budget, and
- how to set up the D9032 Encoder using the embedded interface or the ROSA interface.

This chapter contains the following topics:

Topic	See Page
<b>Section A - Getting started with ROSA</b>	5-6
Installing ROSA and Drivers	5-6
Installing the D9032 Encoder Device Driver	5-7
Setting Up the Search Range for the D9032 Encoder Agent	5-9
Setting Up the Search Range for the D9032 Encoder Agent	5-9
Working With the User Interface in ROSA	5-13
<b>Section B - The Web Interface</b>	5-14
Before You Begin	5-14
Logging On to the Web Interface	5-15
Creating a Logon Password	5-16
Web Interface - Summary Screen	5-17
Tab Pages	5-18
The Menu Bar and Buttons	5-19
Context-Sensitive Online Help	5-20
<b>Section C - TS Rate Budget</b>	5-21
Making a TS Rate Budget	5-21
<b>Section D - Setting Up the Video</b>	5-22
Setting Up the Video Input	5-22
Setting Up the Video Encoder	5-24
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## Overview, Continued

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Topic (Continued)	See Page
Reduced Delay Guidelines	5-29
Delay, Bit Rate and Consecutive B-pictures	5-31
Setting Up the Video Encoder Aspect Ratio	5-33
Setting Up the Video Encoder Rate	5-35
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Setting Up the Pre-Processor Parameters	5-47
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Enabling or Disabling the Audio Channels	5-54
Setting Up the Layer II Audio Input	5-55
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# Section A - Getting started with ROSA

## Installing ROSA and Drivers

---

### Installation Procedure

Before you can set up your D9032 Encoder device under ROSA you must proceed as follows.

1. Install the ROSA/COPERNICUS management software. Install
  - **ROSA Single User (SU)**<sup>1)</sup> if you want additional features like backup tasks, trend analysis, UDDs and set up all D9032 Encoders from the same PC, **or**
  - **The ROSA Client if you have the COPERNICUS installed.**

**Note:** If you are unfamiliar with installing ROSA and drivers, please refer to chapter 1 in the ROSA manuals described in **Related Documentation**, page xxviii.

2. Install the D9032 Encoder device driver.  
For further information, see **Installing the D9032 Encoder Device Driver**, page 5-7.
3. Set the IP address of the D9032 Encoder from the front panel. For further information, see **System Menu**, page 4-25.

1) Since the ROSA Client and ROSA SU offer identical functionality, you can also log on to a server with the ROSA SU.

# Installing the D9032 Encoder Device Driver

## Before You Start

Before you can install the D9032 Encoder device driver you have to install the ROSA management system and the SNMP protocol driver on your PC. See the ROSA manual for information on how to install ROSA.

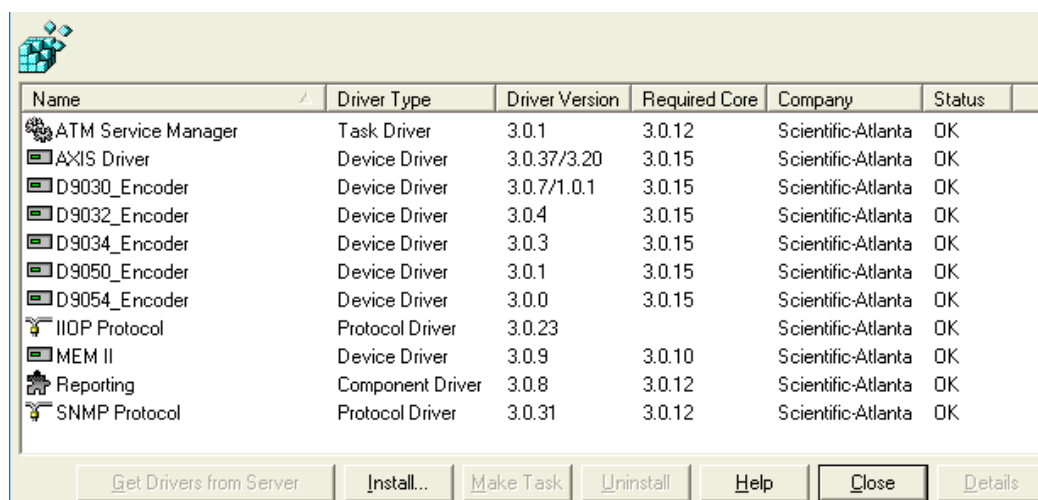
**Important:** You need a license to install the device driver. If you need to install the ROSA Single user this also requires a license.

You can get a license file by contacting Field Services at one of the Scientific Atlanta support centers. For further information, see **Product Support**, page 7-2.

## To Install the D9032 Encoder Device Driver

Do as follows to install the D9032 Encoder device driver:

1. Insert a CD ROM with the D9032 Encoder device driver in your CD ROM drive.
2. Start the ROSA management system.
3. Right-click the **COPERNICUS** icon, select **Connect** and click **OK**.
4. Click the **Resource Drivers** button from the tool bar.



Name	Driver Type	Driver Version	Required Core	Company	Status
ATM Service Manager	Task Driver	3.0.1	3.0.12	Scientific-Atlanta	OK
AXIS Driver	Device Driver	3.0.37/3.20	3.0.15	Scientific-Atlanta	OK
D9030_Encoder	Device Driver	3.0.7/1.0.1	3.0.15	Scientific-Atlanta	OK
D9032_Encoder	Device Driver	3.0.4	3.0.15	Scientific-Atlanta	OK
D9034_Encoder	Device Driver	3.0.3	3.0.15	Scientific-Atlanta	OK
D9050_Encoder	Device Driver	3.0.1	3.0.15	Scientific-Atlanta	OK
D9054_Encoder	Device Driver	3.0.0	3.0.15	Scientific-Atlanta	OK
IIOP Protocol	Protocol Driver	3.0.23		Scientific-Atlanta	OK
MEM II	Device Driver	3.0.9	3.0.10	Scientific-Atlanta	OK
Reporting	Component Driver	3.0.8	3.0.12	Scientific-Atlanta	OK
SNMP Protocol	Protocol Driver	3.0.31	3.0.12	Scientific-Atlanta	OK

Check that the SNMP Protocol driver is present. If not, install it by clicking the **Install** button and pointing to your device driver folder on your hard disk.

5. Click the **Install** button and install the D9032 Encoder driver.  
Install the driver by selecting the "D9032\_Encoder.rsd" file and clicking the **Open** button.

## Installing the D9032 Encoder Device Driver, Continued

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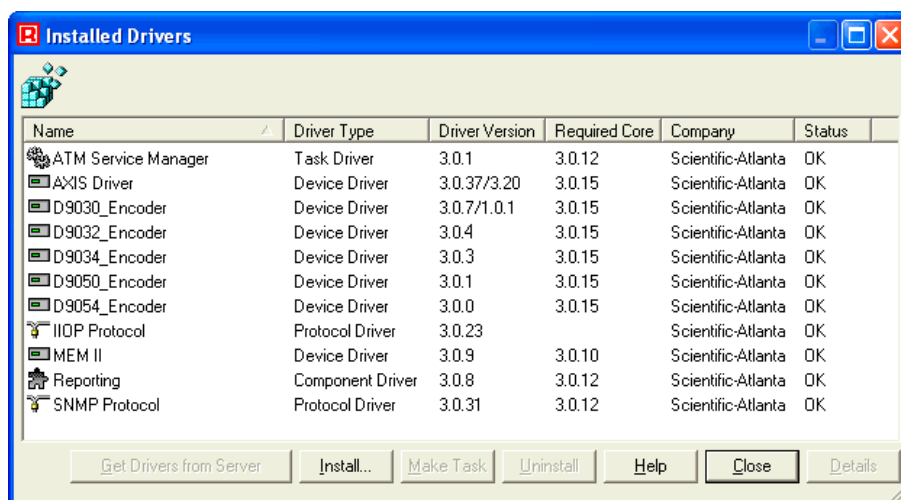
6. Click **OK** and verify that the D9032 Encoder device driver is installed.
7. Close the **Installed Drivers** window.

**Note:** If you have previously installed a D9032 driver and are now installing a new one, you will be asked to reboot the COPERNICUS.

8. If you are asked to reboot after installing the D9032 driver do as follows:

Step	Action
1	Select <b>Manage --&gt; Reboot server</b> on the Server menu.
2	Reconnect the COPERNICUS.
3	Right-click the <b>COPERNICUS</b> icon, select <b>Connect</b> and click <b>OK</b> .
4	Click the <b>Resource Drivers</b> button from the tool bar.
5	Verify that the D9032 Encoder device driver is installed.

9. Close the **Installed Drivers** window.





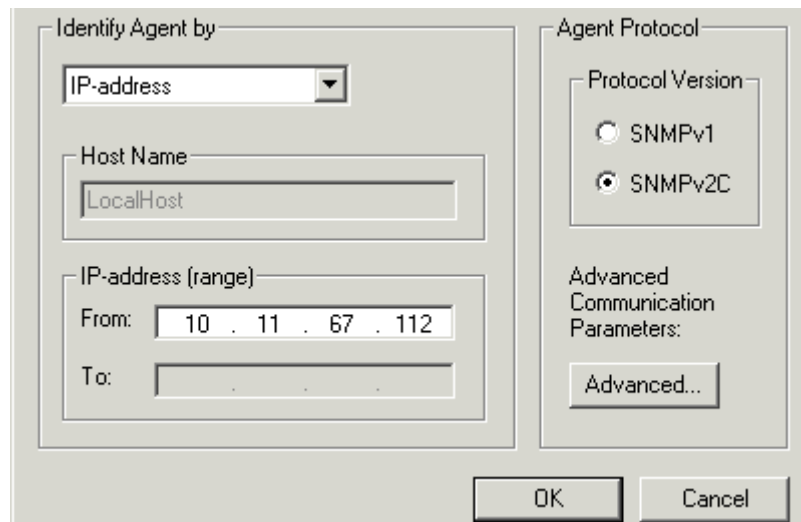
## Setting Up the Search Range for the D9032 Encoder Agent

---

### To Set Up the Search Range

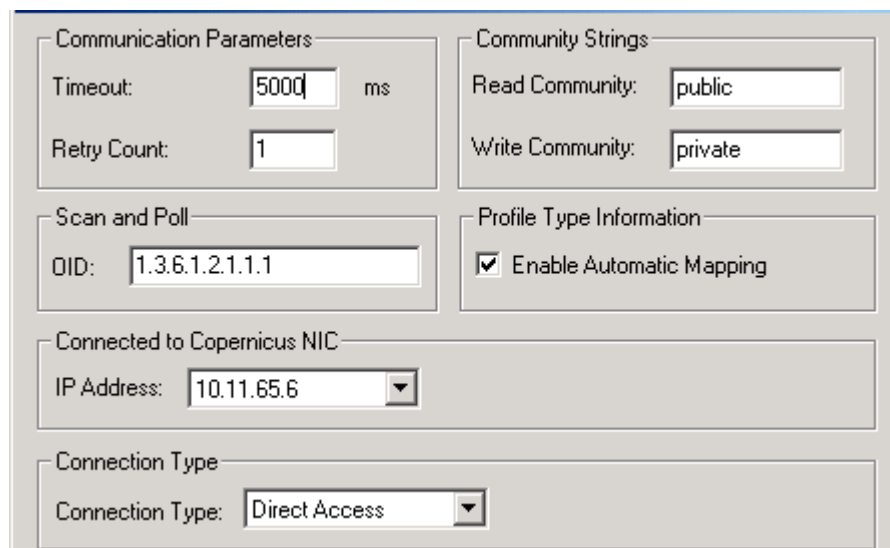
Do as follows:

1. From the COPERNICUS Explorer right-click the **SNMP Protocol** and select **Properties**.  
The SNMP protocol is under Protocol Drivers.
2. Click the **Add...** button.
3. Select **IP-address** from the **Identify Agent by** drop down list.
4. Type the IP address of the D9032 Encoder in the **IP-address (range)** From field.
5. Select protocol version **SNMPv2C**.



The dialog box titled "Identify Agent by" is shown. It has two main sections. The left section, "Identify Agent by", contains a dropdown menu set to "IP-address", a "Host Name" field with "LocalHost", and an "IP-address (range)" section with "From:" and "To:" fields. The "From:" field contains "10 . 11 . 67 . 112". The right section, "Agent Protocol", contains a "Protocol Version" group box with radio buttons for "SNMPv1" and "SNMPv2C", where "SNMPv2C" is selected. Below this is an "Advanced Communication Parameters:" section with an "Advanced..." button. At the bottom are "OK" and "Cancel" buttons.

6. Click **Advanced...**



The "Advanced Communication Parameters" dialog box is shown. It has several sections. "Communication Parameters" includes "Timeout:" (5000 ms) and "Retry Count:" (1). "Community Strings" includes "Read Community:" (public) and "Write Community:" (private). "Scan and Poll" includes an "OID:" field (1.3.6.1.2.1.1.1). "Profile Type Information" includes a checked checkbox for "Enable Automatic Mapping". "Connected to Copernicus NIC" includes an "IP Address:" dropdown (10.11.65.6). "Connection Type" includes a "Connection Type:" dropdown (Direct Access). At the bottom are "OK" and "Cancel" buttons.

## Setting Up the Search Range for the D9032 Encoder Agent, continued

---

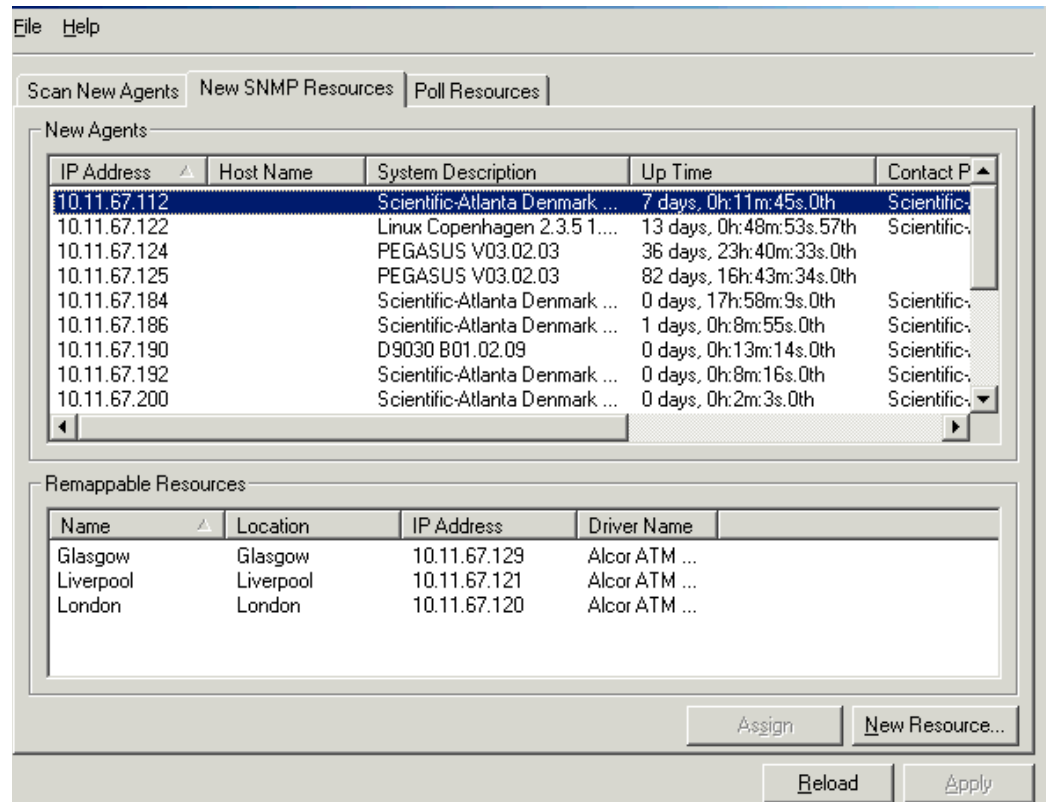
7. Make sure that Read Community is set to public and Write Community is set to private.  
If not, type **public** in the **Read Community** field and **private** in the **Write Community** field. These are the only settings that will work.
8. Set the **Time-out** period to for example to 5000 ms.  
**Note:** If you set the **Time-out** too low you may risk losing contact with the units.
9. Check the Enable Automatic Mapping box.  
If you check this box you need not follow the procedure described in **Assigning the D9032 Encoder Agent as a Unit in ROSA**, page 5-11. The unit is automatically mapped to a D9032 Encoder. This is particularly helpful if you are setting up many encoders.
10. Click **OK** twice.
11. Click **Apply**.  
**Result:** ROSA will now search for D9032 Encoder units at the given IP address.

## Assigning the D9032 Encoder Agent as a Unit in ROSA

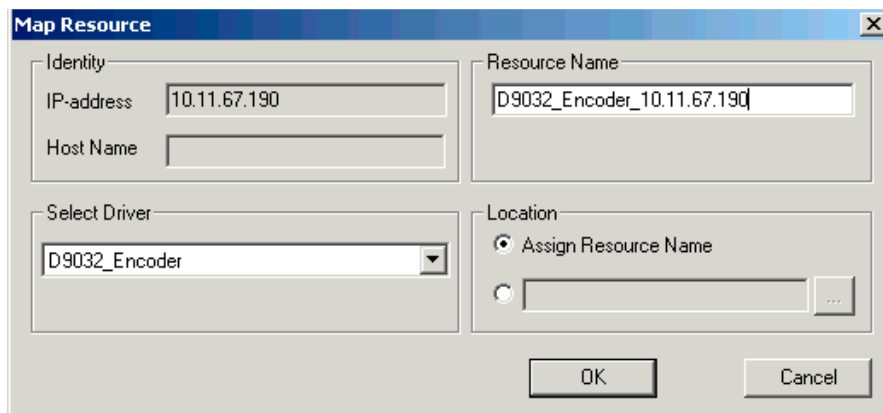
### To Assign the D9032 Encoder Agent as a Unit in ROSA

Do as follows to assign the D9032 Encoder agent as a unit in ROSA:

1. From the SNMP Protocol Properties window, click the **New SNMP Resources** tab and select the new resource.



2. Click **New Resource**.
3. Select D9032 Encoder driver from the **Select Driver** drop down list.



## Assigning the D9032 Encoder Agent as a Unit in ROSA, Continued

---

4. Click **Assign Resource Name**.

ROSA automatically gives the resource a name containing the device name and IP address.

The location is the physical location of the unit. You might have a main site with e.g. 60 D9032 Encoders, but also a number of remote sites that also have some D9032 Encoders and are linked with the main site via a LAN. In ROSA, you can define the different physical locations of your units. For example:

main\_headend\_Brussels\_airport, hub\_Brussels\_south, hub\_Brussels\_north etc.

Suppose there is a problem with one of the encoders, the location that was assigned to the unit tells the service technician immediately where to go and find the failing unit.

5. Click **OK**.

Repeat the above procedure for every D9032 Encoder agent you want to assign as a unit in ROSA.

6. Close the window.

**Result:** The D9032 Encoder is now in the COPERNICUS Explorer window.

Once you have set up the trap destination the ROSA system will be able to receive traps (messages) from the

7. D9032 Encoder. For further information on how to set up trap destinations, see **Setting Up the Trap Destinations**, page 5-128.

# Working With the User Interface in ROSA

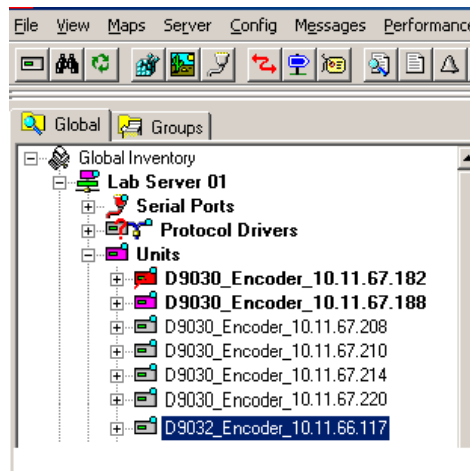
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## Opening the User Interface

To access the settings of the D9032 Encoder, the ROSA PC must be connected to the unit, either using ROSA/COPERNICUS from a central control station or ROSA stand-alone on a locally connected PC.

Proceed as follows:

1. Right-click the D9032 Encoder icon under the **Units** node in the COPERNICUS Explorer.
2. Select **Properties**.  
If you have the unit in a map you can double-click the D9032 Encoder bitmap to open the user interface.



## Important

If you have a firewall between the D9032 Encoder and the COPERNICUS server you may need to change the protection settings to allow the SNMP traps from the D9032 Encoder (UDP packets) to arrive to the COPERNICUS. To enable the D9032 Encoder Alarm/Message mechanism in ROSA you must add a trap destination IP address to which the D9032 Encoder will start sending its SNMP traps. For further information, see **Setting Up the Trap Destinations**, page 5-128.

## Section B - The Web Interface<sup>2)</sup>

### Before You Begin

---

#### Overview

When you have connected a PC and the D9032 Encoder to an ethernet network you can set up and control the unit from the Internet Explorer browser.

#### Minimum Requirements

Make sure that your computer meets the following requirements before accessing the Web interface from your computer.

Item	Requirements
Processor	Pentium™ II processor or higher
Operating system	<ul style="list-style-type: none"><li>• Windows 98 or Me</li><li>• Windows NT 4.0</li><li>• Windows 2000 with Service Pack 3a</li><li>• Windows XP</li></ul>
Web browser	Internet Explorer version 6 or greater
Display resolution	1024 x 768 pixels
Mouse + keyboard	Required
Ethernet connection	Required

#### Adding the D9032 Encoder to the Ethernet

Proceed as follows to set add the D9032 Encoder to the Ethernet:

1. Connect the D9032 Encoder to the Ethernet.  
For further information, see **Connecting the Units**, page 1-1.
2. Set up the IP address of the D9032 Encoder via the front panel or via the GUI.  
For further information, see **Front Panel Setup**.

2) Although the following sections are applicable to the web interface, the setup procedures under ROSA are similar to those described in the following section.

# Logging On to the Web Interface

---

## To Log on to the Web Interface

Proceed as follows to log on to the Web Interface:

1. Open MS Internet Explorer.
2. Type the IP address of the D9032 Encoder to set up in the Address bar and press Enter.

**Note:** Proceed to steps 3 and 4 below if you have previously created a logon.

3. Type the user name if you have created a logon.

**Note:** The default user name and password are both sa (as shipped with the encoder). They are used by the encoder if you have not created a logon. When the default user name and password are used, you are not prompted to log on to the encoder.



**Note:** If you have forgotten your user name and password you can reset them from the front panel user interface.

4. Type the password if you have previously created a logon.

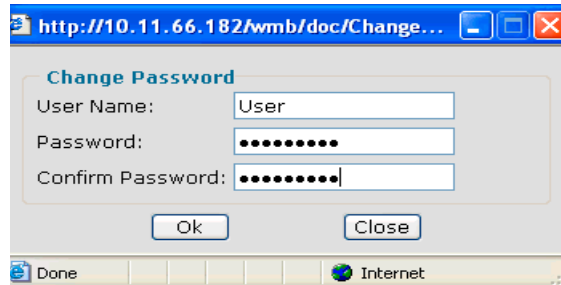
# Creating a Logon Password

---

## To Create a Logon Password

Proceed as follows to create a logon password:

1. Log on to the D9032 Encoder GUI.
2. Click the Logon button.
3. Type a user name and a password.



The user name and password can be a maximum of 32 ASCII characters.

**Important:** The password and user name will be remembered for the whole of the web session. Close the web browser if you want to prevent others from getting access to the settings of the D9032 Encoder.

**Note:** If you forget your user name and password you can reset them from the front panel menu of the D9032 Encoder.

4. Type the new password once more.
5. Click OK.
6. Reset the D9032 Encoder.

You reset the D9032 Encoder by pressing the Reset button from the System tab page.



## Web Interface - Summary Screen

### To get an Overview of the Main D9032 Encoder Settings

Proceed as follows to get an overview of the main D9032 Encoder settings:

1. Log on to the Web Interface.
2. Click the Summary tab.

The screenshot displays the 'D9032 Encoder' web interface. At the top, there are 'Logon' and 'Help' buttons, and the 'Scientific Atlanta' logo. Below the title bar, a row of tabs includes 'Summary' (selected), 'Video', 'Pre-Processor', 'Audio', 'VBI', 'DPI', 'TS Output', 'PSI', and 'System'. The main content area is divided into several sections:

- Video Section:** A table with columns: Enabled, GOP, Picture Width, Input, Mode, Max. Rate<sub>bit/s</sub>, Default Rate<sub>bit/s</sub>, Min. Rate<sub>bit/s</sub>, PID, and Prog #. The values are: Enabled (checked), GOP (15,2), Picture Width (704), Input (SDI 625), Mode (Fixed), Max. Rate (5,000,000), Default Rate (5,000,000), Min. Rate (8000), PID (8000), and Prog # (1).
- Audio Section:** A table with columns: Encoder, Ch., Mode, Bit Rate<sub>kbit/s</sub>, Sample Rate<sub>Hz</sub>, Input Type, PID, and Prog #. It lists four audio channels (1-4) using Dolby Digital encoding, all in Stereo 2/0 mode with a 192 kbit/s bit rate and 48000 Hz sample rate. Input types are Analog. PIDs are 8001, 8003, 8005, and 8007. Prog # values are 1 (V) for all.
- Pre-Processor Section:** A table with columns: Function and Enabled. It lists 'Pre-Processor' and 'Pre-Analysis' (both checked) and 'Noise-Reduction' (unchecked).
- DPI Section:** A table with columns: Enabled, Start Trigger, Stop Trigger, and DTMF. The 'Enabled' checkbox is checked.
- VBI Section:** A table with columns: Source, EBU Teletext, DVB-VBI, and Closed Captions. The values are: Source (Auto), EBU Teletext (checked), DVB-VBI (checked), and Closed Captions (checked).

The summary display shows the main Video, Pre-processor, Audio, VBI and DPI settings of the D9032 Encoder: some features of which are not available in the D9032 Encoder.

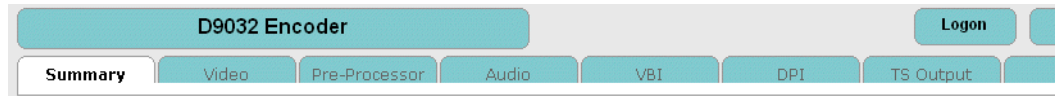
**Note:** Audio programs in the Prog # column have a (V) or an (A) outside the number to signify that the audio is attached to the video respectively an audio only program.

# Tab Pages

---

## Tab Pages

The GUI of the D9032 Encoder has a number of tab pages.



The function for the tab pages is as follows:

- **Summary**  
From this page you can get an overview picture of the most important settings in the D9032 Encoder.
- **Video**  
From this page you can set up the
  - video input type, resolution, and NTSC pedestal
  - picture width, the GOP sequence, chroma format, video aspect ratio
  - encoding delays,
  - video encoder AFD
  - rate for fixed rate (CBR) encoding
  - parameters for statistical multiplexing such as rates, priority and quality
- **Pre-processor**  
From this page you can set up the pre-analysis and noise reduction parameters.
- **Audio**  
From this page you can set up the audio input parameters such as type, impedance, sample rate, clipping level, audio encoding mode, bit rates.
- **VBI**  
From this page you enable or disable the various VBI resources.
- **DPI**  
From this page you set up the digital program insertion parameters.
- **TS Output**  
From this page you can set up the output mode, format and bit rate. You can also set up the parameters for the IP streaming output.
- **PSI**  
From these tab pages you define the PIDs, program names and numbers for the various program elements.
- **System**  
From this tab page you can read various system parameters such as serial number, software version number, system uptime, temperatures and slot information. You can set up trap destinations, see messages and change message settings. You can install options and reboot or default the system.

## The Menu Bar and Buttons

---

### The Help Button

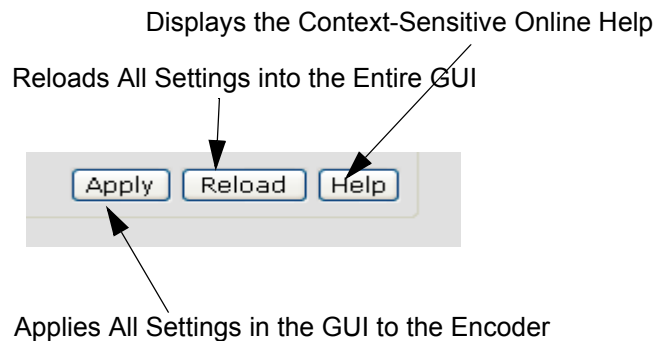
The GUI of the D9032 Encoder has the following help button:



The Table of Contents for the online help file is displayed when you click the Help button.

### The Apply, Reload and Context-sensitive Help Buttons

The GUI of the D9032 Encoder has the following general buttons:



**Note:** **Apply** all values including the new ones are validated against each other. Incompatible settings result in an error message telling you why the values couldn't be set.

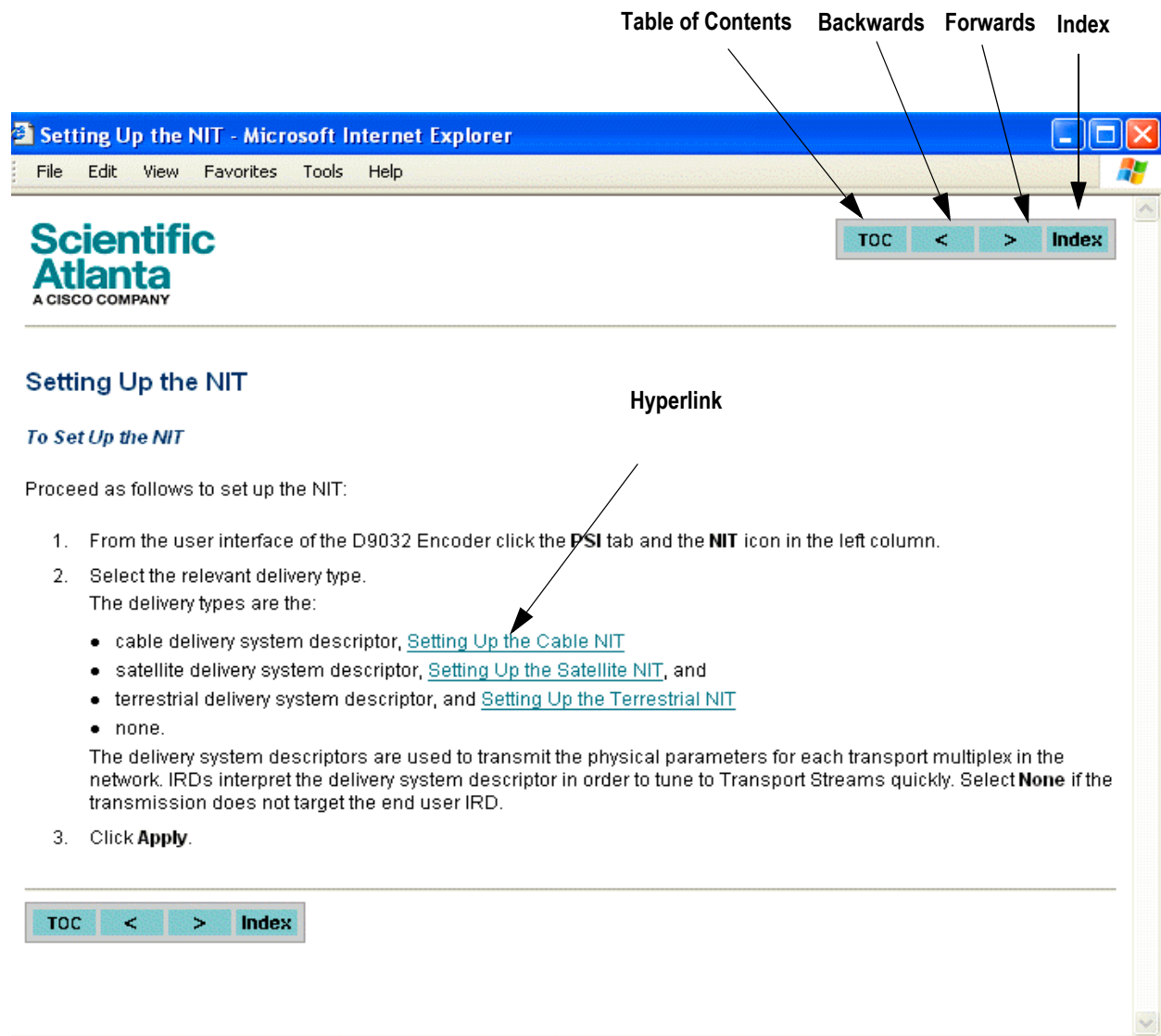
# Context-Sensitive Online Help

## Online Help Features

The GUI of the D9032 Encoder has context-sensitive online help. Just press the help button in the GUI and the help belonging to the current window will display. Throughout the help system there are hypertext links to related topics.

From the help window you can:

- use the table of contents to navigate in the help system
- use the index to find specific topics
- access the Scientific Atlanta web site
- contact Scientific Atlanta support by e-mail



## Section C - TS Rate Budget

### Making a TS Rate Budget

---

#### Introduction

All the audio and video rates in ROSA are Elementary Stream (ES) rates. When you make a bit rate budget you must note down the bit rates for all the tributaries and look up the corresponding TS rates. When you add together all the tributary TS rates you get the total used TS output rate which must be equal to or lower than the specified output TS rate.

Use the TS rate table in **Transport Stream Rates for the Tributaries** to convert the fixed bit rate, or in statmux mode the default rate, to TS rates.

**Note:** The required outgoing TS rate for the D9032 Encoder during statistical multiplexing depends on the maximum instantaneous encoding rate during operation, not the default rate.

We suggest that you make a bit rate budget for the encoders in your system before setting them up. ROSA automatically displays the used payload (bit rate) for the encoder in question, see **Setting Up the ASI Output Parameters**, page 5-92. Use the Multi Encoder Manager for setting up the bit rate budget for several encoders. For further information, see Multi Encoder Manager, Application Layer, User manual, order number 4004150.

## Section D - Setting Up the Video

### Setting Up the Video Input

---

#### To Set Up the Video Input

Proceed as follows to set up the Video Input:

1. From the user interface of the D9032 Encoder click the **Video** tab.

The screenshot shows the D9032 Encoder user interface with the 'Video' tab selected. The interface includes a sidebar with a tree view containing 'Video', 'Encoder', and 'Encoder Rate'. The main panel displays various video input settings:

- Input Type:** A dropdown menu set to 'SDI 625'.
- Composite Input:** Two radio buttons, 'ClearSight™' (selected) and 'Basic'.
- SDI Resolution:** Two radio buttons, '8 bit' and '10 bit' (selected).
- Composite NTSC Pedestal:** A dropdown menu set to '7.5' with a '%' symbol.
- Frame Synchronization:** A dropdown menu set to 'Internal Clock'.
- Action on Input Loss:** A section with a dropdown menu set to 'Black Picture' and a 'Delay' field set to '0' seconds.
- Copyright:** A checkbox that is unchecked.
- Original:** A checkbox that is unchecked.

At the bottom right of the main panel are three buttons: 'Apply', 'Reload', and 'Help'.

2. Select whether the video input source is PAL, PAL N, PAL M, NTSC, 525 lines or 625 lines SDI or SDI Auto.

**Note:** The PAL N and PAL M video formats are only supported with the onboard composite module.

If you select **SDI Auto**, the encoder automatically selects the line type detected in the SDI signal.

3. For Composite select ClearSight or Basic.

**Note:** If you select basic quality only Closed captions from the Basic Composite Input will be available. If you select ClearSight, all VBI features will be available.

4. For digital inputs, select the **SDI Resolution**.

The standard setting is 10 bits. Set the input resolution to 8 bits if you have 8 bits input equipment (such as a video tape recorder) which only supports 8 bits of video data. The encoding resolution is always 8 bits as defined by the MPEG standard.

## Setting Up the Video Input, Continued

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5. For NTSC signals, set the Pedestal Level.  
Select 7.5% unless national stipulations state otherwise. You may select between 0 and 7.5%.
6. Select External Reference if you want to synchronize your video to the reference signal on the reference input or Internal Clock if the video is synchronized to the internal 27 MHz reference clock.  
If you set the frame synchronization to Off the video encoding is locked to the video input. Internal Clock means that the video is synchronized to the internal 27 MHz reference clock.
7. Select the Action on Input Loss.  
This means that if there is an input loss a black picture or a 75% color bar will be output. The default setting is Black Picture.
8. If relevant, set a delay on the action.  
This means that the Action on Input Loss above is delayed with the specified number of seconds. In the specified number of seconds the last valid picture is shown in freeze mode. Please note that this is only possible if the internal frame synchronizer is enabled. We recommend that you set the delay to 1 second to hide temporary short input losses. The legal settings are in the range from 0 to 10.
9. Check the **Copyright** check box if you want to signal that the encoded bit stream is protected by copyright.  
This box is unchecked per default.
10. Check the **Original** check box if you want to signal that the encoded bit stream is an original.  
This box is unchecked per default.
11. Click **Apply**.

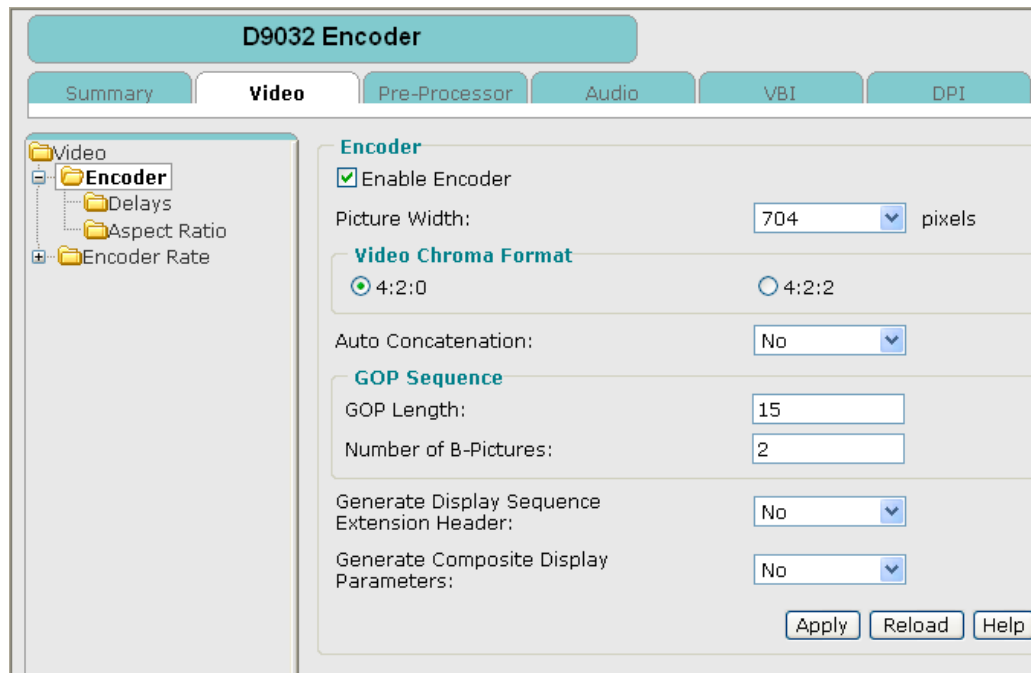
# Setting Up the Video Encoder

## To Set Up the Video Encoder

**Important:** If the GUI displays greyed-out fields or buttons, this means that you do not have the license for the option in question. For information on options, see **Options and Accessories**, page E-3.

Proceed as follows to set up the Video Encoder:

1. From the user interface of the D9032 Encoder click the **Video** tab and the **Encoder** icon from the sub-pages.



2. Enable the video encoder.  
Disabling the video encoder means that the video program will not be encoded. Audio standalone, PSI and SI information will still be encoded. If you have defined an audio only program it will continue to be encoded.
3. Set the picture width to 720 (pixels) unless you have specific requirements.  
The width determines the number of horizontal pixels in the coded picture independently of the input type and format. Changing the width can decrease the resolution of the source material and in this way lower the amount of data to be encoded. The settings are 720, 704, 640, 544, 528, 480, 352.
  - 720 is the normal setting.
  - You select 704 pixels if your incoming signal has a lower number of active horizontal pixels in the picture. This is often sufficient for PAL and NTSC signals. If you observe a slight ringing on the decoder output, use 720 pixels instead.



## Setting Up the Video Encoder, Continued

---

- For mainstream broadcasting applications slightly reduced resolutions, like 640, 544 or 528 pixels, will often suffice.
  - If your bit rate is very low, consider using 480 or even 352 pixels horizontal resolution to optimize the picture quality of a low bit rate signal.
4. Select the chroma format.

Typically you select the 4:2:0 chroma for distribution purposes and the 4:2:2 chroma for contribution purposes.

If you have problems with the video delay, see **Reduced Delay Guidelines**, page 5-29.

**Note:** Depending on installed options you may not be able to select 4:2:2 chroma format
  5. Select the 4:2:0 chroma format if you want to run statistical multiplexing.
  6. Enable Auto-Concatenation if the video input has been previously encoded.

**Important:** You must disable 3:2 PDI to make auto-concatenation work as 3:2 PDI and auto-concatenation cannot coexist. 3:2 PDI can be disabled from the Pre-Processor tab page.

When auto-Concatenation is enabled, the D9032 Encoder monitors the input video, searching for the fingerprint of a previously encoded I-frame (MPEG-2 intra-coded picture). Whenever this is detected the D9032 Encoder will align the position of target encoding I-frames to the position of the input I-frames. This is done with a few seamless adjustments to the GOP.

**Note:** The alignment of the GOP sequence when cascading a number of encoders is known to cause considerably less degradation to the picture quality, than if no effort is made to align the anchor frames.

**Note:** The encoding GOP length must be a multiple of the GOP length used in the previously encoded input material for the detection of I-frames to work.

**Note:** For auto concatenation to work, the previous encoding must be with full picture resolution. You should use the SDI input interface. If you use the Composite input interface analog noise may prevent certain detection of the input I-frame position.

## Setting Up the Video Encoder, Continued

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7. Type the GOP Length.  
The GOP length must be in the range from 1 to 32.

8. Type the number of B-Pictures.  
The number of B pictures must be 0, 1 or 2.

**Note:** Some limitations apply in order to adhere to the MPEG standard. See below for the legal GOP length with zero, one and two B-pictures.

	Zero B-pictures	One B-picture	Two B-pictures
<b>Legal GOP length</b>	1 to	2 to	3,4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31

**Note:** Generally it pays off to increase the GOP length if the video bit rate is low, however, lock-up time in the decoder is increased for long GOPs.

For many applications GOP length of 12 with 2 B-pictures or a GOP length of 15 with 2 B-pictures is a suitable choice.

9. Set the Generate Display Sequence Extension Header to Yes if your decoder supports Display Sequence Extension Headers.  
The default setting is No.
10. Set the Generate Composite Display Parameters to Yes if your input is composite.  
The default setting is No. This setting takes only effect if your input is composite and you use the clear sight module.  
Set the value to No if your decoder doesn't support Composite Display Parameters.
11. Click **Apply**.

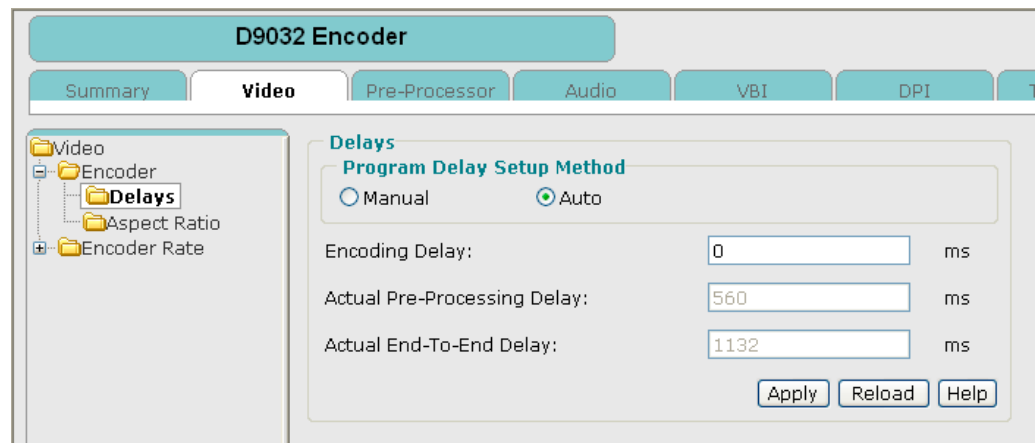
# Setting Up the Video Encoder Delays

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## To Set Up the Video Encoder Delays

Proceed as follows to set up the Video Encoder Delays.

1. From the user interface of the D9032 Encoder click the **Video** tab, expand the **Encoder** icon and click the **Delays** icon from the sub-pages.



The GUI automatically displays the actual pre-processing delay and the actual end-to-end delay. The end-to-end delay includes the pre-processing delay and the encoding delay but excludes any additional delay in external equipment such as implementation delay in decoders.

2. Select the **Manual** or **Auto** delay setup method.

If you select **Manual**, you may specify the encoding delay in ms.

If you select **Auto**, the D9032 Encoder automatically sets the delay to the maximum which gives the best picture quality.

**Note:** It is recommended that you only use the manual delay setup method if it is important to have a specific delay time from the encoder to the decoder. For more information, see **Reduced Delay Guidelines**, page 5-29.

**Note:** You may specify a delay which is shorter, not longer, than the automatic delay.

**Note:** When you reduce the encoding delay the picture quality may be degraded.

**Note:** The total end-to-end delay becomes longer when you have enabled pre-processing.

## Setting Up the Video Encoder Delays, Continued

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3. If relevant, set the Manual Encoding Delay.

**Note:** This may be useful for applications where the delay on a return channel is important, or for game shows with viewer interaction.

**Note:** This setting is ignored if you have checked **Auto**. Also, when you click **Reload**, this setting is not updated if you have selected **Auto**.

**Note:** The manual delay setting is not relevant if you have selected Statistical Multiplexing.

4. Click **Apply**.

# Reduced Delay Guidelines

---

## Settings Influencing the Delay

The delay from encoder to decoder is influenced by the following settings:

- Video chroma format (4:2:0 or 4:2:2)
- Line System (625 or 525 lines) (only to a limited extent, however)
- Video bit rate
- Number of consecutive B-pictures in the GOP sequence
- Pre-processing
- Encoding mode (fixed rate or statmux)
- 3:2 PDI

See also **Delay, Bit Rate and Consecutive B-pictures**, page 5-31.

## Reducing the Delay, in Fixed Rate Encoding

Follow the below guidelines if the end-to-end delay is a critical parameter:

1. Change the video chroma format from 4:2:2 to 4:2:0 if your bit rate is low, typically about 15 Mbit/s.

**Note:** All the changes below will make the video encoding restart, so you should not attempt to change the delay while the encoder is on-air.

Check the resulting delay by pressing **Reload** from the **Delays** sub-pages.

2. Increase the video bit rate, if possible.

For further information, see **Delay, Bit Rate and Consecutive B-pictures**, page 5-29. Check the resulting delay by pressing **Reload** from the **Delays** sub-pages.

3. Disable pre-processing unless the encoding rate is low.

**Note:** If you disable the pre-processing, the picture quality may be degraded, and the encoder cannot perform 3:2 PDI.

Check the resulting delay by pressing **Reload** from the **Delays** sub-pages.

4. Reduce the number of B-pictures in the GOP sequence.

Check the resulting delay by pressing **Reload** from the **Delays** sub-pages.

5. Reduce the delay time.

From the **Delays** sub-pages you click **Manual**, type the wanted delay in the **Encoding Delay** field and click **Apply**.

**Note:** When you reduce the delay, the picture quality may be degraded. The acceptable reduction depends on the actual setup.

6. Use a sufficiently long GOP.

Check the resulting delay by pressing the **Reload** from the **Delays** sub-pages.

## Reduced Delay Guidelines, Continued

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### Guide Line

The following table shows our recommended minimum bit rates for various reduced delays. The recommendation assumes MP@ML, a GOP without B-pictures and 704 or 720 pixels in the picture. You may reduce the bit rate by approximately a factor of two using the 352 pixels setting.

Delay, ms	Bit rate, Mbit/s
150	$\geq 10$
200	$\geq 8$
250	$\geq 6$
300	$\geq 5$

# Delay, Bit Rate and Consecutive B-pictures

## Important!

The following curves display an end-to-end delay for fixed rate encoding, i.e., from the video input connector on the encoder to the video output connector on the decoder.

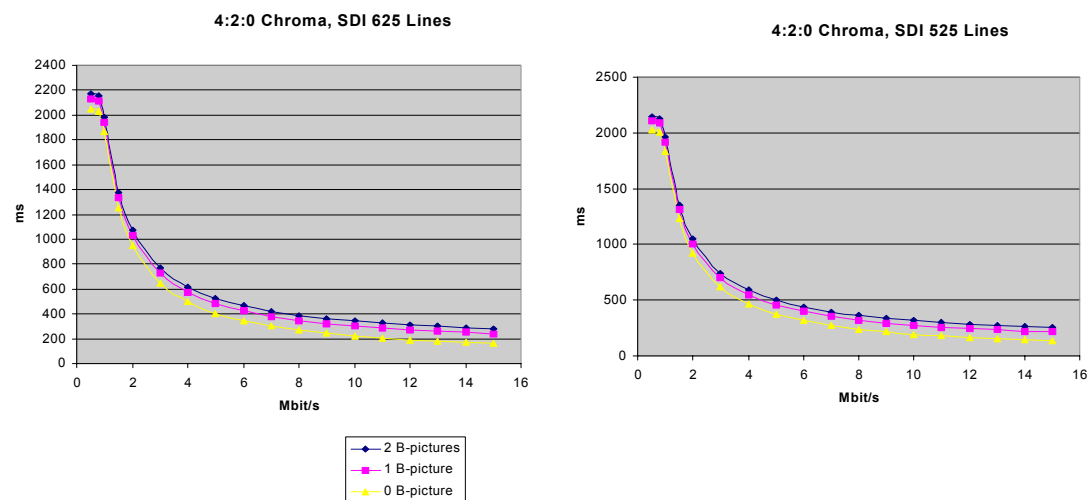
- For information on delay for statmux operation refer to the Maximum Video Delay on page **Setting Up the Statistical Multiplexing**, page 5-38.

Note the following:

- The curves are valid for SDI interfaces. If you use composite input on the encoder, you must add one field delay (20 ms for PAL and approximately 17 ms for NTSC). The delay is almost independent of whether SDI or composite output is used on the decoder.

## Delay for MP@ML Fixed Rate Encoding

The following illustration shows the relation between the delay, bit rate and number of consecutive B-pictures in 4:2:0 chroma mode when the encoding delay is set to **Auto**.

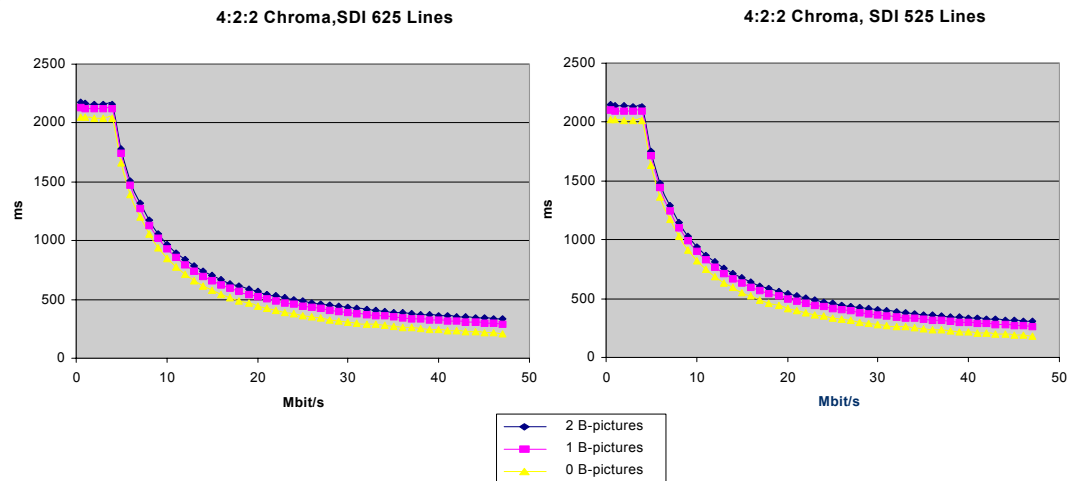


**Note:** The D9032 Encoder automatically limits the encoding delay for fixed rate encoding to 2 seconds (excluding the pre-processing delay and delay in external equipment) for low bit rates.

## Delay, Bit Rate and Consecutive B-pictures, Continued

### Delays in 4:2:2 Chroma Mode

The following illustration shows the relation between the delay, bit rate and number of consecutive B-pictures in 4:2:2 chroma mode when the encoding delay is set to **Auto**.



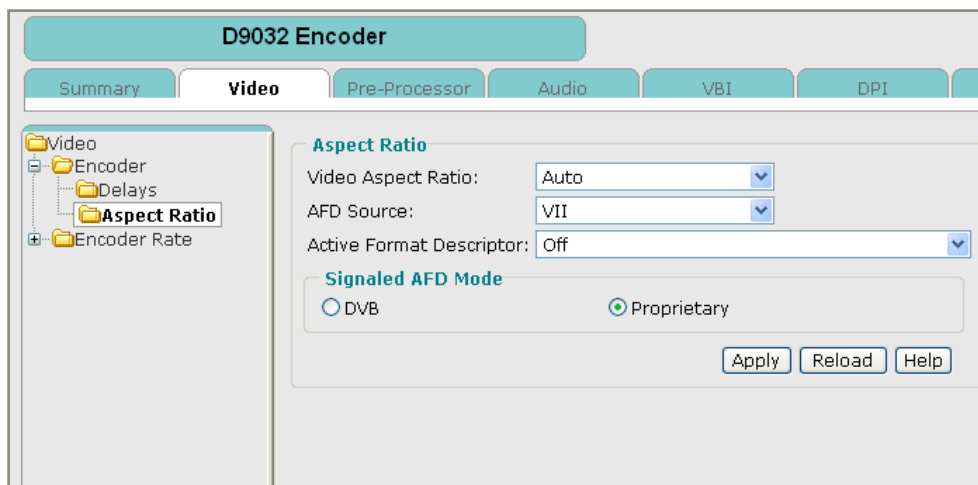


# Setting Up the Video Encoder Aspect Ratio

## To Set Up the Video Encoder Aspect Ratio

Proceed as follows to set up the Video Encoder Aspect Ratio:

1. From the user interface of the D9032 Encoder click the **Video** tab, expand the **Encoder** icon and click the **Aspect Ratio** icon from the sub-pages.



2. Set the video aspect ratio.  
You select **Auto** to let the encoder automatically select the aspect ratio extracted from the incoming VII in the SDI input or WSS from the Composite/SDI module. Select 16:9 for wide-screen format. Select 4:3 for standard television format.
3. Select the AFD Source:

AFD Source	Description
VII	VII from the SDI signal
WSS	WSS from the sampled WSS in the SDI input or WSS from the Composite module.
VII or Else WSS	VII from the SDI signal as first priority and sampled WSS in the SDI input/or WSS from the Composite input as second priority.

**Important:** WSS as AFD source does not require WSS to be enabled from the VBI tab page. Note however, that you must have set line 23 for 625 lines systems to ETSI WSS or AFD WSS. For further information, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81.

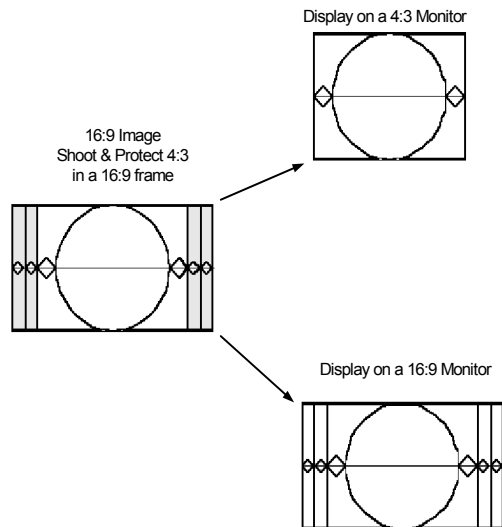
## Setting Up the Video Encoder Aspect Ratio, Continued

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### 4. Select the Active Format Descriptor.

The AFD is used for signaling to the set-top box or IRD how the coded video image is best displayed when the monitor does not match the coded image.

**Example:** If you have a 16:9 format picture and the decoder/receiver has a 4:3 monitor, you can select “16x9 with shoot & protect 4x3” to represent the picture as shoot & protect 4:3 format.



**Note:** AFD is only applicable in 625 lines systems.

- If you select **Off**, no AFD signaling is present in the MPEG user data bits.
- **Auto** means that if the input is SDI containing VII, the AFD signaling adapts to the incoming AFD bits in the VII signal. If the input is Composite or SDI without VII, the AFD value signals “As source aspect ratio”.
- All other selections will force the AFD signaling to the new setting, regardless of the video format (Composite or SDI) and regardless of any incoming VII/WSS information.

**Note:** If the VII/WSS is lost in the incoming signal, the AFD remains set to the last detected format until a system reset or a video input loss, or until the VII/WSS returns.

### 5. Unless you have specific requirements set the **Signaled AFD** to **DVB** mode.

You select **DVB** mode when the signaled aspect ratio must follow the generated AFD value in accordance with DVB standard TR 101 154 V1.4.1. You set up the generated AFD value via the **Active Format Descriptor** combo box described in step 2.

You select **Proprietary** mode when the encoder is used together with the Titan IRD MKII decoder from Scientific Atlanta. This decoder needs the original video aspect ratio to produce a correct center cut picture on a 4:3 monitor.

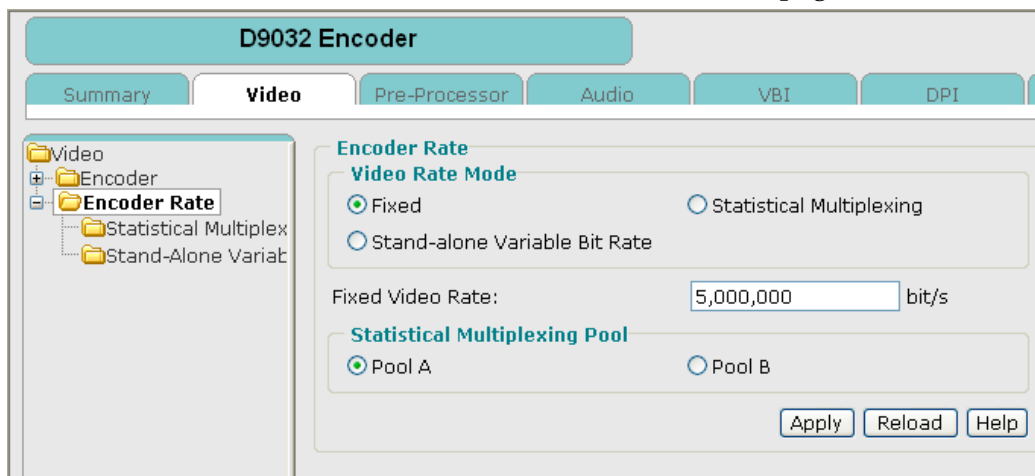
### 6. Click **Apply**.

# Setting Up the Video Encoder Rate

## To Set Up the Video Encoder Rate

Proceed as follows to set up the Video Encoder Rate:

1. From the user interface of the D9032 Encoder click the Video tab expand the **Encoder** icon and click the **Encoder Rate** icon from the sub-pages.



2. Select **Fixed** mode or , **Stand-alone Variable Bit Rate** or **Statistical Multiplexing** mode.

**Note:** To be able to use the statistical multiplexing feature you must have a D9032 Encoder. This feature is not available in the D9032 Encoder.

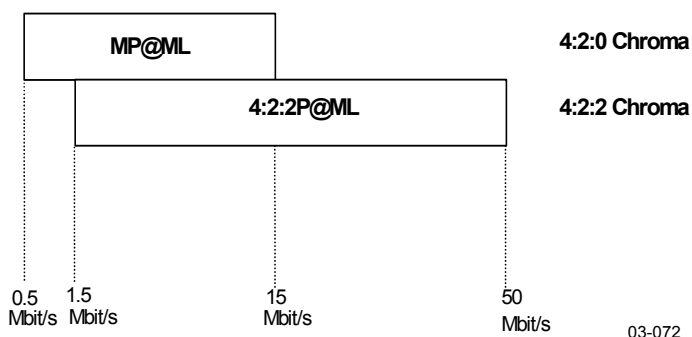
**Note:** To be able to use the statistical multiplexing feature you must connect the D9032 Encoder to the Statistical Multiplex Controller. For further information, see *Regulus, Statistical Multiplex Controller, User and Service manual part number 4006277 Rev B*.

- Fixed rate encoding means that the encoding rate does not vary over time. This is also known as Constant Bit Rate (CBR) encoding.
- The statmux mode means that the channel is statistically multiplexed according to the parameters defined on the statistical multiplexing subpage (accessed from the Video tab page). For further information, see **Setting Up the Statistical Multiplexing**, page 5-38.
- Stand-alone Variable Bit Rate means that the D9032 Encoder provides a variable bit rate output itself and in this mode there is no need for an external statistical multiplex controller. On the other hand an external transrater device is required. This could for instance be the BMR from BigBand or the Digital Content Manager (DCM) from Scientific Atlanta.

## Setting Up the Video Encoder Rate, Continued

- Set the fixed video bit rate.

The legal bit rate is from 0.5 to 15 Mbit/s for the 4:2:0 Chroma format and from 1.5 to 50 Mbit/s for the 4:2:2 Video Chroma format.



**Note:** The D9032 Encoder will stop encoding if you specify a bit rate lower than the ones specified above.

If the D9032 Encoder does not have the 4:2:2 option installed, any setting outside the main profile is ignored. For information on how to set up the bit rate budget, see **Making a TS Rate Budget**, page 5-21.

**Note:** Observe the minimum bit rates for the various GOP lengths.

For the relationship between bit rate, profile, number of B-pictures and codec delay, see **Reduced Delay Guidelines**, page 5-29. The table below shows the lowest recommended bit rate at various GOP lengths:

GOP length	Lowest Recommended Rate in Fixed Video Rate Encoding				
	720/704 Pixels Width	640 Pixels Width	544/528 Pixels Width	480 Pixels Width	352 Pixels Width
I only	≥ 6 Mbit/s	≥ 5.5 Mbit/s	≥ 5 Mbit/s	≥ 4.5 Mbit/s	≥ 4 Mbit/s
≥ 2	≥ 4 Mbit/s	≥ 3.75 Mbit/s	≥ 3.5 Mbit/s	≥ 3.25 Mbit/s	≥ 3 Mbit/s
≥ 3	≥ 3 Mbit/s	≥ 2.75 Mbit/s	≥ 2.5 Mbit/s	≥ 2.25 Mbit/s	≥ 2 Mbit/s
≥ 4	≥ 2 Mbit/s	≥ 1.9 Mbit/s	≥ 1.8 Mbit/s	≥ 1.6 Mbit/s	≥ 1.5 Mbit/s

**Note:** The setting supports rates between 0.5 and 15 Mbit/s for the 4:2:0 Chroma format and between 1.5 and 50 Mbit/s for the 4:2:2 Chroma format. However, you must observe the rates above.

## Setting Up the Video Encoder Rate, Continued

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4. For statistical multiplexing with two pools select Statmux pool A or B.  
For further information, see *Regulus, Statistical Multiplex Controller, User and Service manual part number 4006277 Rev B*.
5. Click **Apply**.

# Setting Up the Statistical Multiplexing

## Before You Begin

To be able to use the statistical multiplexing feature you need to connect the D9032 Encoder to the Statistical Multiplex Controller.

**Note:** You need a statmux license for each D9032 Encoder that runs in statmux mode.

To set up several D9032 Encoders you use the Multi-Encoder Manager, Application Layer. For further information you may use *Multi Encoder Manager, Application Layer, User manual, part number 4004150*.

## To Set Up the Statistical Multiplexing

Proceed as follows to set up the Statistical Multiplexing:

1. From the user interface of the D9032 Encoder click the **Video** tab, expand the **Encoder Rate** icon and click the **Statistical Multiplexing** icon from the sub-pages.

The screenshot displays the 'D9032 Encoder' web interface. The 'Video' tab is selected, and the 'Encoder Rate' icon is expanded in the left sidebar, showing the 'Statistical Multiplexing' sub-page. The main configuration area is titled 'Statistical Multiplexing' and includes the following sections:

- Mode:** IP (selected) with Address: 255.255.255.255 and Controller Port: Management. RS-232 is also an option.
- Pools:** IP Controlled (selected) with Pool: 1. RS-232 Controlled (Pool A and Pool B) is also an option.
- Maximum Video Rate:** 6,000,000 bit/s
- Default Video Rate:** 3,000,000 bit/s
- Minimum Video Rate:** 800,000 bit/s
- Priority:** A slider from 0 to 15, currently set at 8.
- Target Video Quality:** A slider from 0 to 15, currently set at 15.
- Maximum Video Delay:** Normal (selected) or Extended.

Buttons for 'Apply', 'Reload', and 'Help' are located at the bottom right of the configuration area.

**Note:** The maximum video rate must be higher than (or equal to) the default video rate, and the default video rate must be higher than (or equal to) the minimum rate.

## Setting Up the Statistical Multiplexing, Continued

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2. Set the maximum video rate.

This setting is used to guarantee that the rate for a channel does not exceed a specified value. The legal range is from 1.5 to 15 Mbit/s. If you do not need limitation to a specific rate, we recommend that you use a setting about 2 to 3 times the default video rate, or just leave the setting at its maximum (15 Mbit/s).

**Example:** A typical application is that you want to extract programs from the statistical multiplex bouquet and forward these programs separately. In that case, you may need to limit the maximum rate of each channel to extract so that you avoid overflow of the equipment that handles the extracted statmux programs.

The maximum video rate limit setting does not imply that the Statistical Multiplex Controller will try to go up to that rate, but simply that it will not exceed that rate. The maximum video rate during operation may be lower if the statmux pool size does not allow room for it.

**Note:** Stating a maximum rate limit may reduce the probability of reaching the target video quality.

**Note:** You should use the target video quality limit setting and not the maximum video rate limit setting to choose your maximum picture quality limit.

## Setting Up the Statistical Multiplexing, Continued

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3. Set the default video rate.

The legal range is from 0.5 to 15 Mbit/s. The default video rate is the channel's contribution to the statmux pool when the D9032 Encoder participates in statistical multiplexing with the Statistical Multiplex Controller. During statistical multiplex operation, each D9032 Encoder that participates in statistical multiplexing will be granted capacity from the statmux pool. The sum of the default video rates for the active statmux channels equals the size of the statmux bit rate pool.

The total rate of the statmux channels will not go beyond the statmux pool size, but may go lower depending on the target video quality.

The default video rate determines the encoding rate at which the encoder starts after power-up. Also, it determines the rate the encoder settles to during communication errors between the Statistical Multiplex Controller and the D9032 Encoder, or when the Statistical Multiplex Controller is disconnected.

The default video rate is also used to set up the TS rate budget. For information on how much the other tributaries require of the available capacity, see **Transport Stream Rates for the Tributaries**, page C-3.

For further information on setting up the default video rates, see **Determining the Default Video Rate**, page 5-43.

4. If relevant, set the minimum video rate.

The legal range is from 0.5 to 15 Mbit/s. The instantaneous rate during statmux operation will not go below the stated minimum video rate. The instantaneous rate may be higher than the stated minimum video rate if so determined by the rate algorithm. The minimum statmux rate depends on the complexity of the picture and the picture resolution. We recommend as a starting point that you set the minimum video rate to half the default video rate.

**Note:** The lowest recommended minimum rate varies depending on the horizontal resolution and the delay mode:

Horizontal Resolution	Lowest Minimum Rate (Mbit/s)		
	Extended Delay	Normal Delay	Low Delay
720/704	1.11	1.30	1.49
640	0.91	1.10	1.40
544/528	0.86	1.00	1.31
480	0.76	0.86	1.20
352	0.65	0.76	0.99



## Setting Up the Statistical Multiplexing, Continued

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5. Set the priority.

The priority setting determines how to weight the video quality of a channel compared to the other channels in the statmux pool. There is a total of 16 values from 0 to 15 so that you may give each of the 16 potential statmux channels a different priority if you want to. You are also allowed to give different channels the same priority. If all channels are equally important, the priority setting should be the same for all channels. The standard setting for all channels is 8. We recommend that you leave the priority setting at the standard setting unless you want to prioritize your statmux channels differently.

6. Set the target video quality.

This parameter sets the maximum quality for the video channel. It is used to free capacity for opportunistic IP data when your video quality requirements are met. The joint rate control algorithm ensures that the encoders do not spend more bits on the video than required.

The standard setting for all channels is 15 (Best). If you leave the target video quality for all channels at 15, the Statistical Multiplex Controller will attempt to use all of the statmux pool.

**Hint:** Keep the target video quality setting at 15 if you do not want to insert IP data. If you want to make room for IP data, you may experiment to reduce the quality limit to find the level that is appropriate for your service.

The following settings are recommended for the various applications:

Application	Max. Quality Limit
Best possible quality	15
High quality	14, 13, 12
Medium quality	11, 10, 9
Reduced quality	8, 7, 6, 5
Low quality	4, 3, 2, 1, 0

**Note:** The smaller the statmux pool, the less frequently you will reach the target quality limit. How often depends on the video material. You may go back to step 3 and change the default video rate if you want to. As a rule of thumb, the more important IP data is, compared to the video, the lower the target video quality should be.

## Setting Up the Statistical Multiplexing, Continued

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7. Set the maximum video delay.

Delay	Explanation
Low	Represents a VBV (MPEG-2 Video Buffering Verifier) delay of 714.8 ms
Normal	Represents a VBV delay of 1000.0 ms
Extended	Represents a VBV delay of 1190.6 ms.

**Note:** The usual restrictions apply for the mixed setup, so you must select identical maximum video delays for the encoders that participate in the same statmux pool. If the delays are different, you risk overflow of the Transport Stream. You must also ensure that the software version of the SD encoders is capable of statmuxing with HD encoders.

**Note:** Some decoders may require that you select normal delay.

8. Click **Apply**.

## Determining the Default Video Rate

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### To Determine the Default Video Rate

1. It is recommended that you initially set the default video rates for all statmux channels to the same value.

You may change individual channel rates later.

You may use the following table to calculate the size of the statmux pool. You can also use the table to calculate the number of programs you can have if you already know the size of the statmux pool and the type of program material:

Requirements	Default Video Rate per Channel
High number of channels	2 to 3½ Mbit/s
Typical video material	3 to 5 Mbit/s
Top performance distribution application	4 to 8 Mbit/s

**Note:** When the number of statmux channels is high you may typically reduce the default video rates slightly while maintaining the same subjective quality.

If you have experience from a fixed rate service, it may be a good idea to start using default video rates comparable to the previous fixed rates.

**Note:** The above default video rates are only provided as guidance. The actual default video rates in your setup will depend on your application, the anticipated source material, and your quality requirements. The smaller the size of the statmux pool compared to the target video quality, the less frequently you will reach the quality limit.

The table below shows our lowest recommended default video rate at various GOP lengths in Statmux mode:

GOP length	Lowest Recommended Default Rate in Statmux Mode				
	720/704 Pixels Width	640 Pixels Width	544/528 Pixels Width	480 Pixels Width	352 Pixels Width
I only	≥ 6 Mbit/s	≥ 5.5 Mbit/s	≥ 5 Mbit/s	≥ 4.5 Mbit/s	≥ 4 Mbit/s
≥ 2	≥ 4 Mbit/s	≥ 3.75 Mbit/s	≥ 3.5 Mbit/s	≥ 3.25 Mbit/s	≥ 3 Mbit/s
≥ 3	≥ 3 Mbit/s	≥ 2.75 Mbit/s	≥ 2.5 Mbit/s	≥ 2.25 Mbit/s	≥ 2 Mbit/s
≥ 4	≥ 2 Mbit/s	≥ 1.9 Mbit/s	≥ 1.8 Mbit/s	≥ 1.6 Mbit/s	≥ 1.5 Mbit/s

## Determining the Default Video Rate, Continued

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2. If required, set the default video rate higher for some of the channel(s).  
This improves the quality of the changed channels when the Statistical Multiplex Controller is powered down.
3. Use higher default video rates for any channels with full resolution and lower default video rates for any channels with reduced resolution.

4. Do as follows if you have to use low default video rates.

What is considered low default video rates depends on your operational requirements, but is likely (but not necessarily) below 2.5 to 3 Mbit/s for full resolution.

This may be applicable in the applications where bandwidth is a very limited resource and you need to distribute a high number of channels:

- Use pre-processing; both pre-analysis, adaptive quantization matrices and noise reduction to ease the encoding.
- Ensure that the sources are clean with low noise and few artifacts. In general, the more noise and artefacts, the higher the default video rates you need.
- Consider reducing the horizontal resolution, particularly when a source provides soft pictures.

**Note:** You may change the default video rate on the run without interruption of the service. This can be used to make more room for a new service or to utilize more of the available capacity when a program is discontinued.

Observe the lowest recommended default video rate for different GOP lengths as specified in the table “Lowest Recommended Default Video Rate in Statmux Mode”.

Depending on the video material, the actual encoding rate during statmuxing may be lower than the lowest recommended default video rate.

For normal statmux operation you will typically not use short GOPs. If you, for some reason, use short GOPs, observe that the lowest recommended default video rate depends on the GOP length.

# Setting Up the Stand-Alone Variable Bit Rate

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## Before You Begin

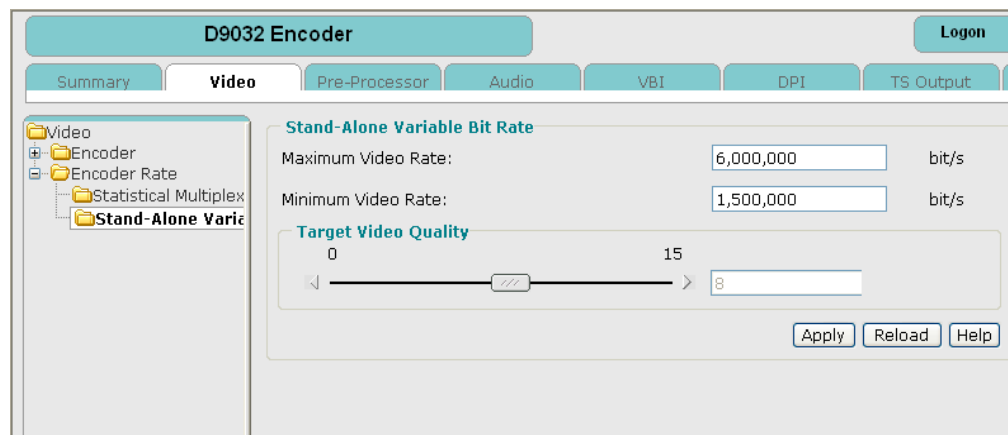
You can use the stand-alone variable bit rate feature in a setup where you want to save bandwidth without using statistical multiplexing and a Statistical Multiplex Controller.

In such a setup a multiplexer such as the PowerVu Model D9140 Advanced Multiplexer or the Digital Content Manager (DCM) typically makes sure that the bit rate budget is not violated.

## To Set Up the Stand-alone Variable Bit Rate

Proceed as follows to set up the Stand-alone Variable Bit Rate:

1. From the user interface of the D9032 Encoder click the **Video** tab, expand the **Encoder Rate** icon and click the **Stand-alone Variable Bit Rate** icon from the sub-pages.



2. Set the Maximum Video Rate.  
This setting is used to avoid that the rate for a channel exceeds a specified value. The legal range is from 1.5 to 15 Mbit/s. If you do not need rate limitation, you should leave the setting at the maximum (15 Mbit/s).
3. Set the Minimum Video Rate.  
The legal range is from 0.76 to 15 Mbit/s. The instantaneous rate during operation will not go below the stated minimum rate. The instantaneous rate may be higher than the stated minimum rate if so determined by the rate algorithm. The lowest possible minimum rate depends on the complexity of the picture and the horizontal picture resolution.

## Setting Up the Stand-Alone Variable Bit Rate, Continued

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**Note:** The lowest possible minimum rate varies depending on the horizontal resolution:

Horizontal Resolution	Lowest Minimum Rate (Mbit/s)
720/704	1.30
640	1.10
544/528	1.00
480	0.86
352	0.76

4. Set the Target Video Quality.

This parameter sets the maximum quality for the video channel. It is used to free capacity for opportunistic IP data when your video quality requirements are met. The joint rate control algorithm ensures that the encoder does not spend more bits on the video than required.

The default setting for all channels is 8.

**Hint:** Set the target quality setting to 15 if you do not want to insert IP data. You may then experiment to reduce the quality limit to find the level that is appropriate for your service.

The following settings are recommended for various applications:

Application	Max. Quality Limit
Best possible quality	15
High quality	14, 13, 12
Medium quality	11, 10, 9
Reduced quality	8, 7, 6, 5
Low quality	4, 3, 2, 1, 0

5. Click **Apply**.

## Section E - Setting Up the Pre-Processor

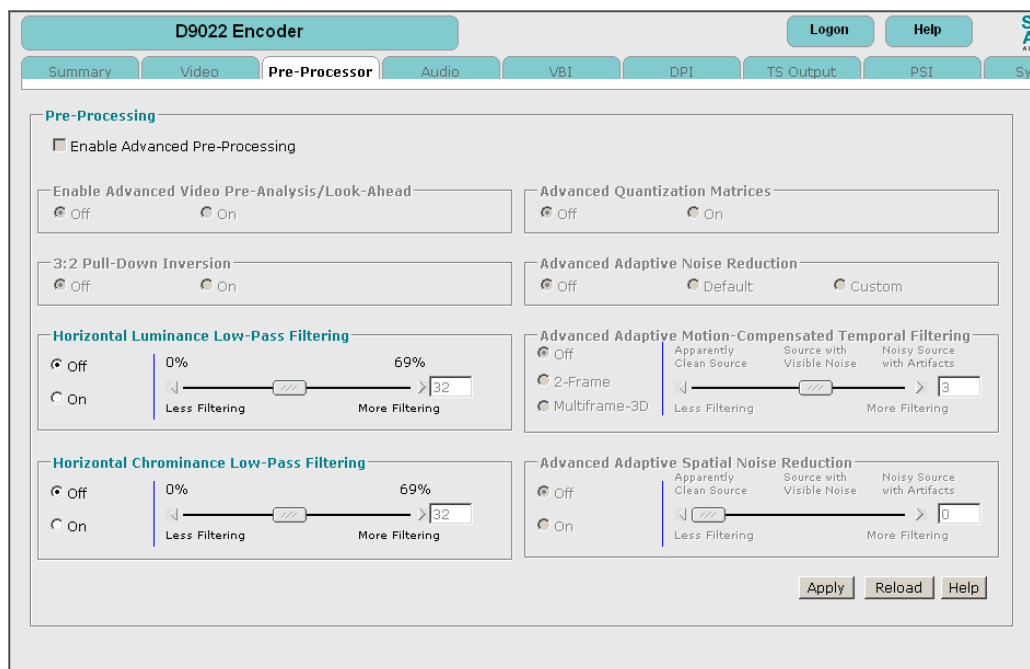
### Setting Up the Pre-Processor Parameters

#### To Set Up the Pre-Processor Parameters

**Important:** If the GUI displays greyed-out fields or buttons, this means that you do not have a license for the option in question or the feature is not available. you have set a parameter which excludes another. For information on options, see **Options and Accessories**, page F-3.

Proceed as follows to set up the Pre-processor:

1. From the user interface of the D9032 Encoder click the **Pre-Processor** tab.



2. Select whether or not you want to enable the pre-processor.

Normally you will enable pre-processing as it provides an improved picture quality at a lower video rate.

**Note:** For applications where the delay is an issue, you may need to disable pre-processing to keep the end-to-end delay sufficiently low.

**Hint:** You may see the resulting end-to-end delay by clicking the **Video** tab expanding the **Encoder** icon on the sub-page and clicking the **Delay** icon.

## Setting Up the Pre-Processor Parameters, Continued

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3. Set the Advanced Video Pre-analysis/Look-ahead (PreSight*Plus* pre-analysis option) to On or Off.

For the best video quality set the pre-analysis to On. The pre-analysis interacts with the control of the MPEG-2 encoding engine so that MPEG-2 parameters and encoding behavior may be changed dynamically frame by frame.

For statistical multiplexing, the look-ahead of the pre-analysis provides an “early warning” of things to happen in the incoming video source. In that way, the allocation of bits to all the D9032 Encoders that participate in statistical multiplexing runs smoothly and closely coupled to the nature of the video contents.

**Important:** If one of the statmux programs uses pre-analysis they all must use pre-analysis.

4. Set the 3:2 Pulldown Inversion (abbreviated 3:2 PDI) to On if you are going to encode 525 lines material.

This improves the picture quality when encoding 525 lines material that originates from film.

**Important:** Make sure the pre-analysis has been enabled and that auto-concatenation has been disabled. Otherwise the 3:2 PDI will not work. You disable auto-concatenation from the Video Encoder tab page.

Turn off the 3:2 PDI in the following instances:

Situation	Reason
Your decoders are not fully MPEG-2 compliant.	The decoders may not accept information on picture repetition and cannot regenerate a correct video sequence.
You need to encode all frames (in a 525 lines system).	3:2 PDI removes some of the frames and this means that you cannot provide full picture-to-picture transparency from the video input to the Transport Stream.

**Note:** The 3:2 PDI feature is not applicable for 625 lines/25 Hz systems. The D9032 Encoder automatically disables 3:2 PDI if you set the D9032 Encoder to PAL or SDI625 input format.

**Note:** Enabling 3:2 PDI increases the delay with 1 frame.

**Important:** Do not enable or disable 3:2 PDI during live operation. The D9032 Encoder restarts if you enable or disable 3:2 PDI.



## Setting Up the Pre-Processor Parameters, Continued

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5. Set the horizontal luminance and chrominance low-pass filters.

The horizontal filters are used to improve the visual appearance during reduced resolution and/or when there is noise in the picture.

The following filter positions are recommended start values for the different resolutions:

Resolution	Luminance	Chrominance
720/704	0%	0%
640	11 %	21%
544/528	21 %	32%
480	27%	37%
352	43%	39%

If your inputs are noisy, you may want to increase the setting to lower the cut-off frequency and thus, to reduce the high-frequency noise.

The D9032 Encoder allows you to set different cut-offs for luminance and chrominance. If you use too high a setting for luminance, the picture will start to loose sharpness, whereas you may turn the chrominance filtering very high without significant visual impairment for a lot of material. If your material is noisy or has been previously encoded, and your encoding rate is low, it is recommended that you turn up the chrominance filtering, likely to one of the highest three settings. For reduced horizontal resolution, you may even want to use the highest possible setting.

6. Set the advanced quantization matrices to **On**.

The D9032 Encoder is able to change the quantization matrices dynamically in order to optimize the encoding. The mechanism addresses both noisy and clean sequences, and has a positive impact on both PQR values and the subjective visual impression.

There are no settings, as the pre-analysis automatically adapts the use of matrices to the incoming video material. The matrices are inserted in the Transport Stream according to the MPEG-2 standard and are utilized by the decoders to mirror the encoding process correctly.

**Important:** Make sure you have enabled pre-analysis. The D9032 Encoder can not change the quantization matrices adaptively if you disable pre-analysis. When you turn off pre-analysis, the D9032 Encoder uses fixed matrices.

## Setting Up the Pre-Processor Parameters, Continued

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**Note:** Some set-top boxes, typically older models, may not be fully compliant to MPEG-2 and may not be able to accept adaptive matrices in the stream. In that case, you need to set the adaptive matrices to Off.

7. Set the Advanced Adaptive Noise Reduction filter to **Default** unless you have specific requirements.
  - **Default** means that the D9032 Encoder dynamically changes the type and level of filtering. The Default setting is intended as a good first choice setting. It allows a filtering action which is not too aggressive, but still provides a visible reduction of noise. This should be your choice if you are uncertain about noise within the source material.
  - **Off** suppresses the filtering.
  - **Custom** enables you to specify a level and combination of filtering. If you have specific requirements to the filtering, or if you have specific knowledge about the source material, you may want to select Custom. This allows you to set the filtering to your preferences as explained in the following steps.
8. Set the Advanced Adaptive Motion-compensated Temporal Filter to 2-Frame or Multiframe-3D.

**Note:** For custom filtering, you must choose between temporal and spatial filtering. Only one of the two filters are supported at the same time.

It is recommended that you turn off the spatial filter and use the temporal filter, unless you are specifically required to use the spatial filter.

Your first choice would be the temporal multiframe-3D filter for any kind of noise. This provides the best noise reduction of the filters offered. It is more efficient than the spatial filter and gives less smearing. This filter has a good effect on, e.g., camera, VCR and film noise. The filter can have a good effect on removing noise in, e.g., text and graphics in composite sources.

The multiframe-3D temporal filter lets you decide how much you want to filter. The more you push the slider to the right, the greater the filtering. For noisy material, you should start with one of the upper two filters. For the upper settings, you'll experience some suppression of composite artifacts and quantizing noise from previous encoding. If you typically operate at higher rates and have good source material, you would likely choose one of the first two settings. The settings in the middle provide a good compromise of filtering and detail preservation.

You may want to experiment with the 2-Frame temporal filter when you only want limited noise filtering. This filter is designed to have very little impact on the content, though it still eases the burden of the encoder.

For both filters the filter action is determined pixel by pixel throughout the whole picture.

## Setting Up the Pre-Processor Parameters, Continued

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In case you do not want the D9032 Encoder to perform temporal filtering, you may set the filter to Off. This could be the case if you do not want the D9032 Encoder to reduce the noise in the source material or if you only want to use spatial filtering.

9. Set the Advanced Adaptive Spatial Noise Reduction to **On** or **Off**.

If you set the filter to On, the filtering action is automatically determined pixel by pixel throughout the whole picture. Your choice depends on how much noise is visible in the source, and on how much you want to filter. Also, the more bits you want to save in a statmux setup, the more filtering you may need to apply. The more you push the slider to the right the greater the filtering.

**Note:** For custom filtering, you must choose between temporal and spatial filtering. Only one of the two filters are supported.

You may experiment which of the spatial and temporal filters that works best for your application and sources. In most cases the multiframe-3D filter is recommended.

10. Click **Apply**.

## 3:2 Pulldown and 3:2 Pulldown Inversion

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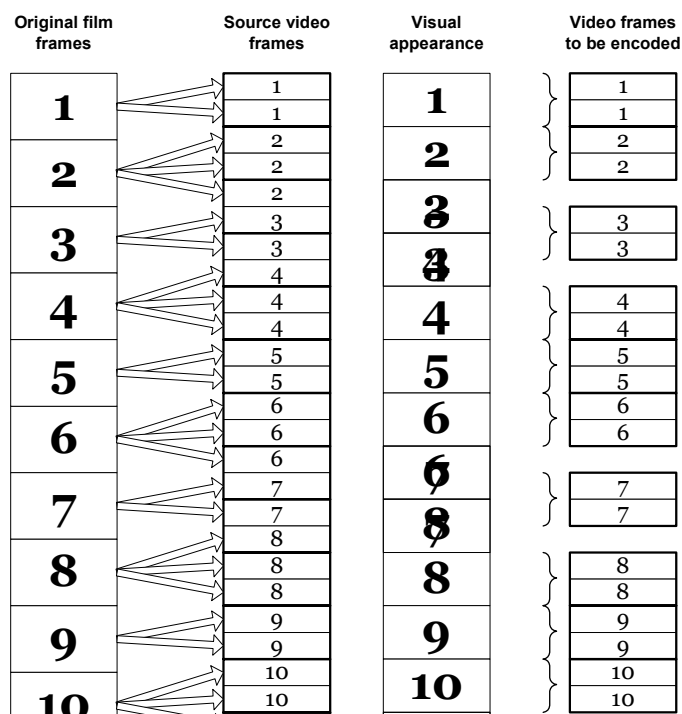
### Overview

When 24 fps film is converted to 30 Hz NTSC video, the film frame rate needs to be up-converted in order to be displayed on a TV set. This process is called 3:2 pulldown.

Basically 3:2 pulldown inversion brings back movie's original frame rate from NTSC's 30 fps to 24 fps.

### 3:2 Pulldown

The 3:2 pulldown technique is used to generate video at NTSC frame rate from a 24 fps film source. With this technique, additional video frames are generated from the film frames according to a characteristic, repetitive pattern. Refer to the figure below.



An unwanted side-effect of this process is picture redundancy and higher load of an encoder. The 3:2 pulldown inversion technique inverts the process and removes the redundant frames thus increasing encoding efficiency.

### 3:2 Pulldown Inversion

The 3:2 PDI feature of the D9032 Encoder excludes the pictures of a 525-line video signal that have been duplicated through 3:2 pulldown, and allows the D9032 Encoder to encode the original frames at film rate. The data in the Transport Stream from the D9032 Encoder includes information on picture repetition so that a standards-compliant decoder may output a video signal at correct 29.97 Hz NTSC frame rate.

## 3:2 Pulldown and 3:2 Pulldown Inversion, Continued

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### Encoder Behavior

The 3:2 pulldown detector of the D9032 Encoder detects if there is a distinctive pattern of the 3:2 pulldown cadence, and controls the encoder actions, time stamping, etc. The D9032 Encoder tracks the input material and goes automatically and seamlessly in and out of 3:2 pulldown inversion, if the 3:2 PDI feature has been enabled. No user intervention is therefore required for channels with mixed film/video originated content.

Especially for low bit rates the 3:2 PDI feature provides a significant improvement of the picture quality when encoding 525-line material that originates from film. The improvement varies with the encoding rate, and the nature of the material. Evidently, the overall benefit to your service depends on how often 3:2 pulldown material actually appears. In normal 525 line distribution applications, we recommend that you enable 3:2 PDI.

## Section F - Setting Up the Audio

### Enabling or Disabling the Audio Channels

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#### Before you Begin

The D9032 Encoder supports two stereo or four mono channels.

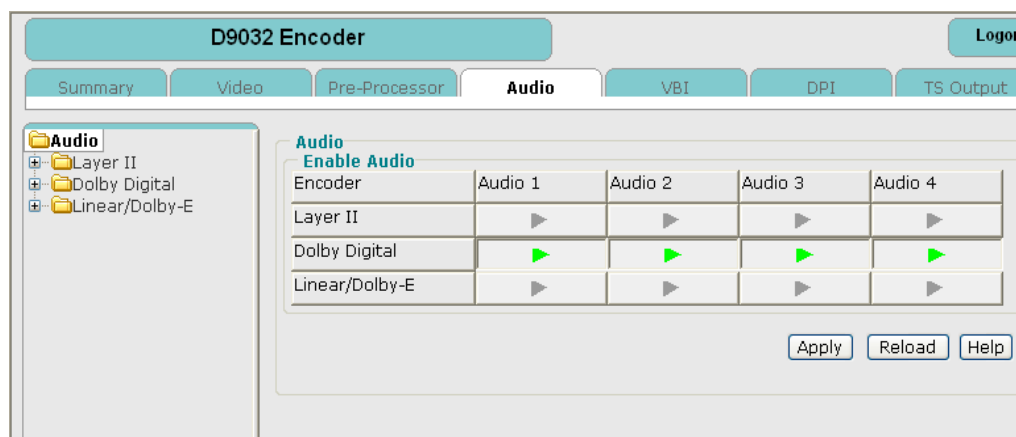
**Note:** The GUI presents the Layer II channels as mono channels and the Dolby Digital and Linear/Dolby E channels as stereo channels. This implies that it is possible to assign individual PIDs to up to four Layer II mono channels and to up to two Dolby Digital or Linear/Dolby E stereo channels.

Each of the audio inputs to the D9032 Encoder accepts either an analog, digital AES/EBU or AES-3id, or embedded input. You can assign any of the encoded audio channels to the video program or to independent audio only programs.

#### To Enable or Disable the Audio Channels

Proceed as follows to enable or disable the audio channels:

1. From the user interface of the D9032 Encoder click the **Audio** tab and click the **Audio** icon from the sub-pages. The GUI displays the available stereo audio channels and the possible channel formats. A highlighted channel icon indicates that the channel in question is enabled.



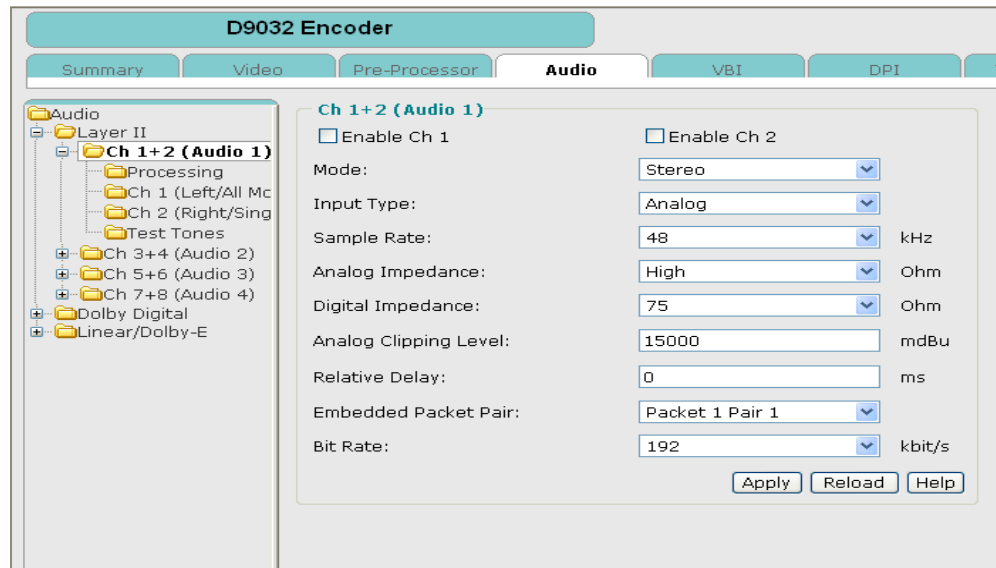
2. If relevant enable the audio channel(s).  
Click the channel in question to enable it. If you click an enabled channel it will be disabled.  
**Note:** If you enable Dolby Digital without having installed the Dolby Digital option and if you have set Passthrough of Dolby Digital to On, the Dolby Digital Passthrough channel will be enabled.
3. Click **Apply**.

# Setting Up the Layer II Audio Input

## To Set Up the Layer II Audio Input

Proceed as follows to set up the Layer II Audio Input:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Layer II icon and click the **Ch 1+2**, **Ch 3+4**, **Ch 5+6** or **Ch 7+8** icon from the sub-pages.



2. If relevant enable the audio channel(s).

Normally Audio Channel 1 is enabled and part of the video program.

**Note:** Audio channel 2 is only applicable when the encoding mode is Single Mono.

**Note:** Enable the audio after you have changed all audio settings if you don't want to transmit the audio while the changes take place.

3. Set the encoding mode.

You may select between Stereo, Joint Stereo, Dual Channel, and Single Mono, and VPS Auto.

## Setting Up the Layer II Audio Input, Continued

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If channel separation is your first priority, you should select Dual Channel. In some cases you use Stereo or Joint Stereo instead as these two modes may optimize the sound quality. Stereo channels may “borrow” bits from each other thus utilizing the available bandwidth. Joint stereo encodes high frequencies with insignificant stereo contents as mono thus utilizing the bandwidth for stereo contents.

**Note:** Do Not use Joint stereo audio coding if you want to transfer matrixed sound (i.e., stereo surround sound). Use Stereo instead. If you use Joint stereo, part of the phase information which is essential for re-creating the surround channel information disappears.

If you select VPS Auto the actual encoding mode is deducted from VPS in the active video signal according to the following table:

VPS Input	VPS Auto
None	Dual
Stereo	Stereo
Dual	Dual
Mono	Mono

4. Select in the **Input Type** field whether your audio input is analog, digital or embedded.

The D9032 Encoder inputs the signal from the Analog/Digital input connector in the selected format. If you select **Embedded** the D9032 Encoder extracts the audio embedded in the active SDI video signal of the program.

5. Select the sample rate of the signal.

Set the sampling rate to 32, 44.1 or 48 kHz.

**Note:** It is not recommended to increase the encoding sample rate above the input sample rate.

**Note:** For the lowest audio bit rates, use the lowest sample rate for improved quality.

6. Select the analog input impedance.

Set the input impedance to 600 Ohms if 600 Ohm termination is required in your system. Set the encoder’s input impedance to High if the source may not be loaded.

7. Select the digital input impedance.

Use 110 Ohms if the audio interface is an AES/EBU interface. Use 75 Ohms if the audio interface is an AES-3id interface.



## Setting Up the Layer II Audio Input, Continued

---

8. Set the analog clipping level.

The legal range is from -6000 to 24000 mdBu. You typically set the clipping level 6 dB above your maximum program level. So, for a maximum level of 9 dBu, set the clipping to 15000 mdBu. If your maximum level is 15 dBu, set the clipping level to 21000 mdBu. The resolution is 500 mdBu.

**Note:** You will only get unity gain if you set the clipping level to the same value for the encoder as the maximum output level in the decoder.

9. Set the relative delay.

The legal range is from -1000 to 1000 ms.

Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program, which has both.

**Example:** If you use external video equipment which adds to the video delay, you type a positive relative audio delay value corresponding to the external video delay.

**Note:** You cannot set a negative relative audio delay greater than the end-to-end delay determined by the video encoder. For information about the video delay, see **Setting Up the Video Encoder Delays**, page 5-27.

10. For embedded audio, select the embedded packet pair.

The SDI video input can contain up to 8 stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to 4 of these channels.

11. Set the bit rate of the signal.

The legal bit rates for Layer II encoding are 32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 and 384 kbit/s.

**Note:** The bit rate must be  $\leq 192$  kbit/s if you set the Layer II mode to Mono.

**Note:** If you use Joint stereo we recommend that you use bit rates up to 128 or 192 kbit/s. Joint Stereo with a bit rate of 256 or 384 kbit/s reduces sound quality compared to stereo.

12. Click **Apply**.

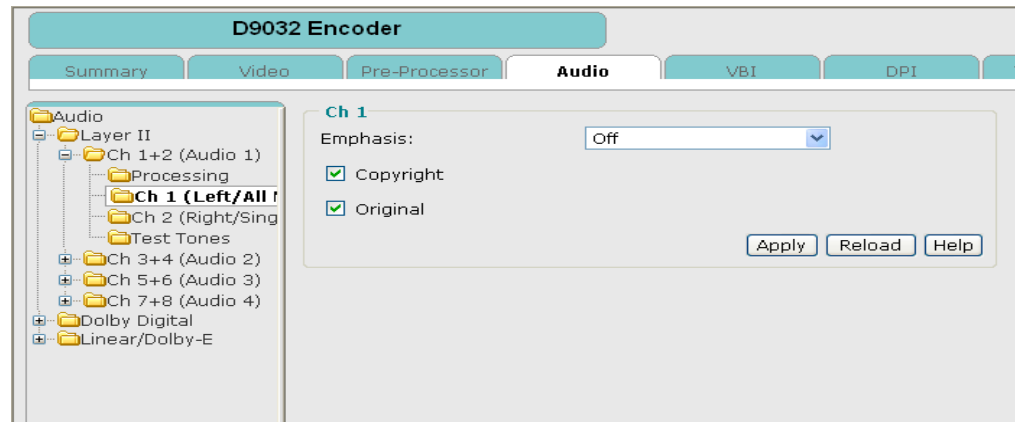
# Setting Up the Layer II Channel Information

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## To Set Up the Layer II Channel Information

Proceed as follows to set up the Layer II Channel Information:

1. From the Layer II sub-pages expand the relevant channel icon and click the left or right channel icon.



**Important:** The left channel applies to all encoding modes whereas the right channel only applies to Single Mono Right.

2. Enable or disable Emphasis

Normally emphasis is set to off. Setting emphasis to on signals that the incoming data signal has pre-emphasis.

**Note:** Observe that the D9032 Encoder only sets a flag and that no de-emphasis filtering takes place.

3. Check the **Copyright** check box if you want to signal that the encoded bit stream is protected by copyright. The copyright has the same meaning as the copyright bit on CDs and DAT tapes, i.e. telling that it is illegal to copy the contents if the bit is set.

This box is checked per default.

4. Check the **Original** check box if you want to signal that the encoded bit stream is located on its original media.

This box is checked per default.

5. Click **Apply**.

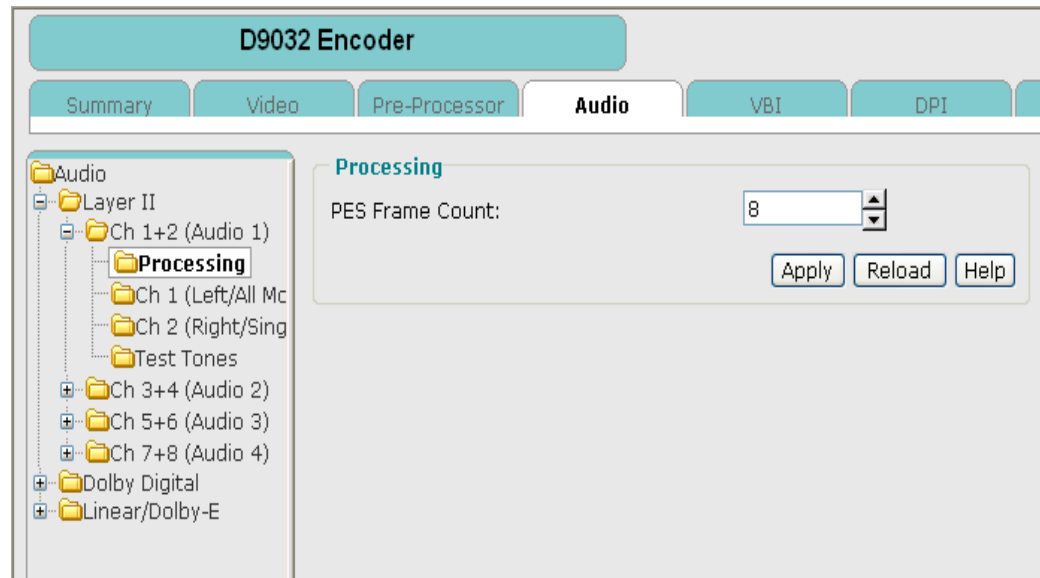
## Setting Up the Layer II Processing

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### To Set Up the Layer II Processing

Proceed as follows to set up the Layer II Processing:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Layer II icon, expand the **Ch 1**, **Ch 2**, **Ch 3** or **Ch 4** icon and click the **Processing** icon from the sub-pages.



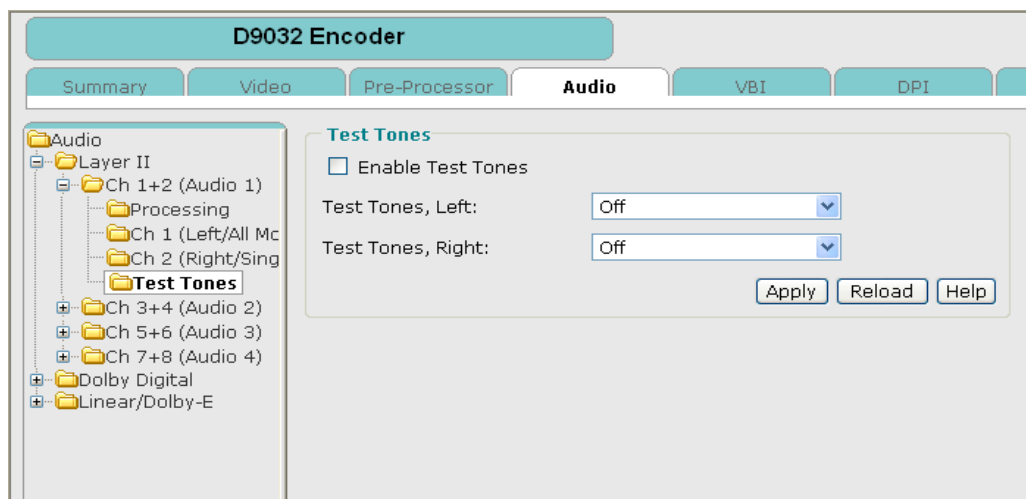
2. Set the PES Frame Count.  
This figure denotes the number of audio frames per PES packet. The legal range is from 1 to 8. The default value is 8.
3. Click **Apply**.

## Setting Up the Layer II Test Tones

### To Set Up the Layer II Test Tones

Proceed as follows to set up the Layer II Test Tones:

1. From the Layer II sub-pages expand the relevant channel icon and click the Test Tones icon.



2. If relevant, set and enable the left and/or right test tones.

**Note:** When Test Tones Left or Test Tones Right are set to Off the respective channel encodes the incoming signal.

This option determines whether to send a test pattern to the left and/or right channel, and the frequency (Hz or kHz) and amplitude of that test pattern. See the table below for possible options:

Test Pattern Values	
Frequency	Amplitude (dBFS)
Off	
125 Hz	-1.05
500 Hz	-1.05
1 kHz	-1.05
1 kHz 21 dB	-21.05
1 kHz 61 dB	-61.05
2 kHz	-1.05
10 kHz	-1.05
Silence	

## Setting Up the Layer II Test Tones, Continued

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**Note:** Digital Silence is used to create a stream with perfect (or digital) silence.

**Note:** The test tone frequencies apply at a sampling frequency of 48 KHz.

3. Click **Apply**.

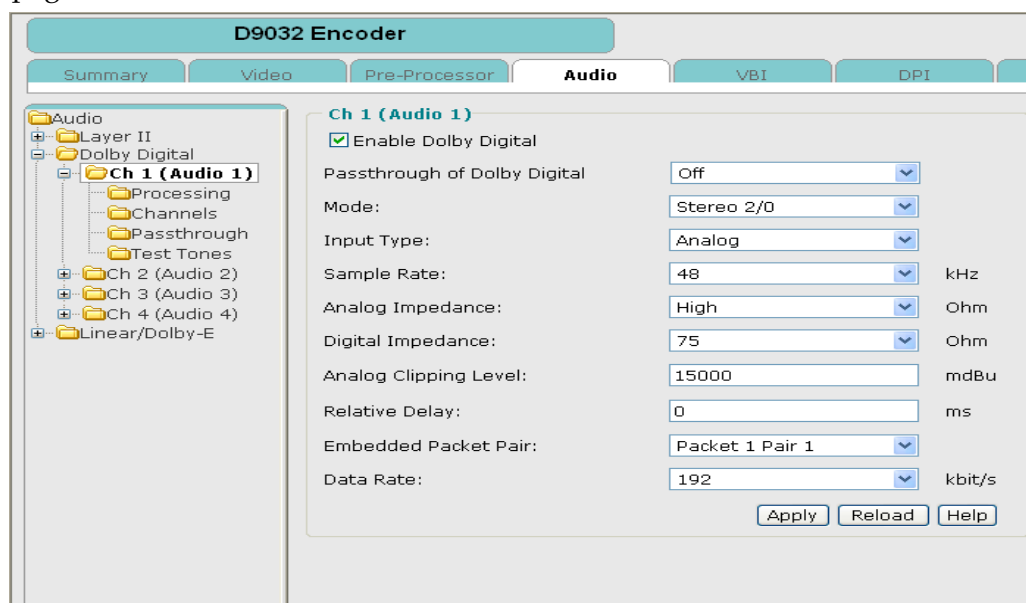
# Setting Up the Dolby Digital Audio Input

## To Set Up the Dolby Digital Audio

**Note:** If the GUI displays grayed out fields or buttons this means that you do not have a license for the option in question. For information on options, see **Options and Accessories**, page E-3.

Proceed as follows to set up the Dolby Digital audio:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Dolby Digital icon and click the **Ch 1**, **Ch 2**, **Ch 3** or **Ch 4** icon from the sub-pages.



**Note:** The D9032 Encoder displays an error message if you try to set up an audio channel without having installed the option.

2. Enable Dolby Digital Encoding.
3. If relevant, enable Passthrough of Dolby Digital.

**Note:** Passthrough of Dolby Digital requires that the Dolby Digital Encoding is enabled in the GUI.

For Passthrough of Dolby Digital you must set the Input Type to Digital or Embedded.

**Note:** Note: It's possible to enable passthrough of Dolby Digital without having the Dolby Digital option installed.

## Setting Up the Dolby Digital Audio Input, Continued

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4. Select the Audio Coding Mode of the input signal.

Use this field to select the number of channels and the channel format within the encoded bit stream.

The three available audio encoding modes are listed below. The mode definition uses two numbers ( $m/n$ ), with  $m$  indicating the number of front channels, and  $n$  indicating the number of rear (surround) channels.

Mode	Channel Format
Stereo 2/0	Left, Right
Dual Mono 1+1	(Left – Channel 1, Right – Channel 2)
Mono (Center) 1/0	Center

The default setting is Stereo (2/0).

If the mode is set to Dual Mono (1+1), then two completely independent program channels, referenced as Mono Channel 1 and Mono Channel 2, are encoded into the bit stream. **Dual-mono mode is primarily intended for professional applications. Dual-mono cannot be expected to work with consumer Dolby Digital (AC-3) decoders.** Dual Mono mode is recommended if simultaneous output of unrelated, independent audio signals is required.

Dual Mono mode gives the greatest degree of audio separation, but requires more complex coding, and, consequently, higher operating bit rates.

5. Select in the **Input Type** field whether your audio input is analog, digital or embedded.

The D9032 Encoder inputs the signal from the Analog/Digital input connector in the selected format. If you select **Embedded**, the D9032 Encoder extracts the audio embedded in the active SDI video signal of the program.

6. Select the sample rate of the signal.

You set the sampling rate to 32, 44.1 or 48 kHz.

**Note:** It is not recommended to increase the encoding sample rate above the input sample rate.

**Note:** For the lowest audio bit rates, use the lowest sample rate for improved quality.

7. Select the analog input impedance.

Set the input impedance to 600 Ohms if 600 Ohm termination is required in your system. Set the encoder's input impedance to High if the source may not be loaded.

## Setting Up the Dolby Digital Audio Input, Continued

---

8. Select the digital input impedance.

Use 110 Ohms if the audio interface is an AES/EBU interface. Use 75 Ohms if the audio interface is an AES-3id interface.

**Note:** Only channels 3 and 4 support AES/EBU.

9. Set the analog clipping level.

The legal range is from -6000 to 24000 mdBu. You typically set the clipping level 6 dB above your maximum program level. So, for a maximum level of 9 dBu, set the clipping to 15000 mdBu. If your maximum level is 15 dBu, set the clipping level to 21000 mdBu. The resolution is 500 mdBu.

**Note:** You will only get unity gain if you set the clipping level to the same value for the encoder as the maximum output level in the decoder.

10. Set the relative delay.

This setting is only applicable to internal Dolby Encoding. In passthrough mode, set the delay of the external passthrough encoder from the Dolby Digital passthrough page. The legal range is from -1000 to 1000 ms.

Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program which has both.

**Example:** If you use external video equipment which adds to the video delay, you type a positive relative audio delay value corresponding to the external video delay.

The resolution is 1 millisecond.

**Note:** You cannot set a negative relative audio delay greater than the end-to-end delay determined by the video encoder. For information about the video delay, see **Setting Up the Video Encoder Delays**, page 5-27.

11. For embedded audio select the embedded packet pair.

The SDI video input can contain up to 8 stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to 4 of these channels.



## Setting Up the Dolby Digital Audio Input, Continued

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### 12. Set the Data Rate of the signal.

Use this field to select the digital audio transmission rate. Settings for the compressed bit rate are available from 56 to 640 kbit/s. Increasing the number in this field increases the audio bandwidth at the encoder, improving the quality of the audio transmitted by the encoder.

The default is 192 Kbit/s.

Use the following bit rate ranges for the selected audio mode.

Mode	Data Rate Range
Stereo 2/0	96 – 640 kbit/s
Dual Mono 1+1	112 – 640 kbit/s
Mono (Center) 1/0	56 – 640 kbit/s

For **passthrough of Dolby Digital**, we recommend that you set the maximum data rate to that of the external Dolby Encoder. If the data rate of the Dolby Encoder is lower than the setting in the D9032 Encoder, the audio will be passed through and only the actual bits in the data stream will be used.

**Note:** The external Dolby Encoder must be locked to the clock of the D9032 Encoder. This can be achieved by connecting the Digital Output of the audio connector to the external encoder.

**Note:** The D9032 Encoder will only be able to provide an external AES/EBU reference signal if the optional audio board is installed.

**Hint:** In a statmux application, you may want to use the maximum data rate setting to secure that a too high and wrong Dolby Encoder setting doesn't disturb the video. If the input bit rate is higher than the setting the audio data is lost.

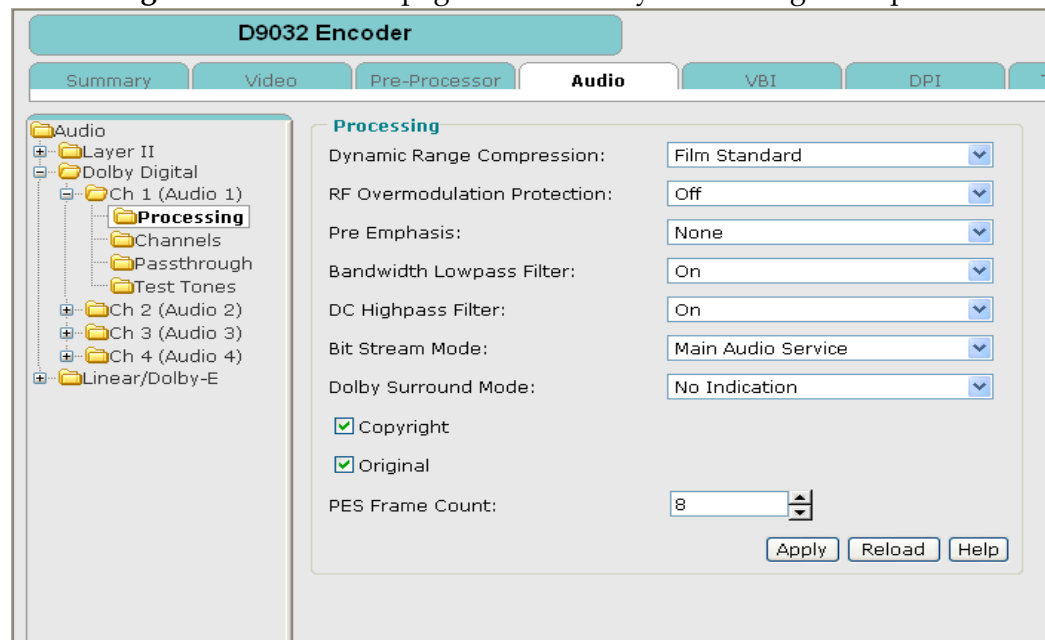
### 13. Click **Apply**.

# Setting Up the Dolby Digital Processing

## To Set Up the Dolby Digital Processing

Proceed as follows to set up the Audio Dolby Digital Processing:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Dolby Digital icon, expand the **Ch 1, Ch 2, Ch 3** or **Ch 4** icon and click the **Processing** icon from the sub-pages. Select the Dynamic Range Compression.



2. Select one of the dynamic range compression presets built into the Dolby Digital encoding/decoding algorithm. Each setting reduces the output of the audio bit stream to a characteristic dynamic range.  
You may select between None, Film Standard, Film Light, Music Standard, Music Light, Speech.
3. If relevant enable the RF Overmodulation Protection.  
By enabling this setting you use an RF pre-emphasis filter to prevent RF over-modulation in set-top decoders. The default is Off.
4. If relevant select the 50/15 microseconds of CCITT J.17 Pre Emphasis.  
Setting Pre-Emphasis to on signifies a pre-emphasis on the incoming signal. Consequently, the D9032 Encoder performs a de-emphasis filtering of the signal.

## Setting Up the Dolby Digital Processing, Continued

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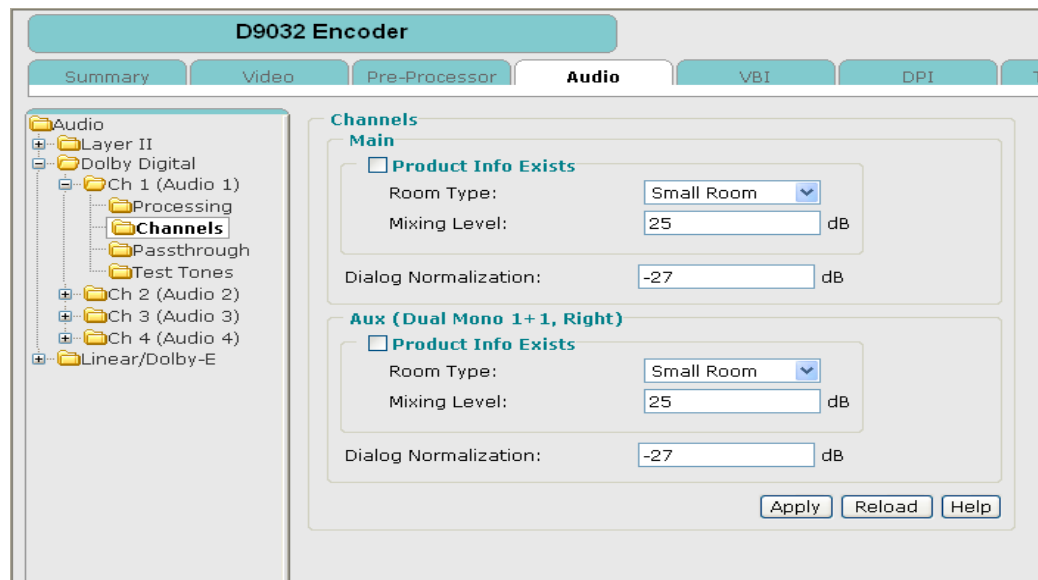
5. If relevant, enable the Bandwidth Lowpass Filter.  
By enabling this filter you apply a low-pass filter to the input channel before the Dolby Digital encoding. The default is On.
6. If relevant, enable the DC Highpass filter.  
By enabling this filter, you apply a DC high-pass filter to the input channel before the Dolby Digital encoding. The default is On.
7. Select the Bit Stream Mode.  
Use this field to select the type of information that the bit stream conveys. This is an information-only field for the benefit of operators and other technicians and *does not* affect the performance or behavior of the actual signal.  
The current system choices are:
  - Main Audio Service
  - Main Audio Service: Dialog
  - Visually Impaired
  - Hearing Impaired
  - Dialog
  - Commentary
  - Emergency Flash
  - Voice Over
  - KaraokeThe default is Main Audio Service.
8. Select the Dolby Surround Mode.  
This option indicates whether or not a two-channel Dolby Digital bit stream is providing a Dolby Surround encoded program. This setting is used only if you have selected Stereo 2/0. Possible options are Dolby Surround Encoded, Not Dolby Surround Encoded, or Not Indicated. The default is "No Indication".
9. Check the **Copyright** check box if you want to signal that the encoded bit stream is protected by copyright. The copyright has the same meaning as the copyright bit on CDs and DAT tapes, i.e., that it is illegal to copy the contents if the bit is set. This box is checked per default.
10. Check the **Original** check box if you want to signal that the encoded bit stream is located on its original media. This box is checked per default.
11. Set the PES Frame Count.  
This figure denotes the number of audio frames per PES packet. The legal range is from 1 to 8. The default value is 8.
12. Click **Apply**.

# Setting Up the Dolby Digital Channels

## To Set Up the Dolby Digital Channels

Proceed as follows to set up the Dolby Digital Channels:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Dolby Digital icon, expand the **Ch 1, Ch 2, Ch 3** or **Ch 4** icon and click the **Channels** icon from the sub-pages.



2. Select whether the **Main** product information exists.

This option indicates whether the room type and mixing level parameters exist within the **Main** Dolby digital bit stream. The default is unchecked (off).

**Note:** If you have selected Dual Mono 1+1 encoding, the **Main Product Info Exists** setting applies to the left channel.

3. Select the **Room Type**.

This option indicates the type of mixing room used for the final audio mixing session. This is used only if the **Main Product Info Exists** is On (see above). Possible options are Small Room, Large Room, and Not Indicated. The default is Small Room.

## Setting Up the Dolby Digital Channels, Continued

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4. Set the **Mixing Level**.

This option indicates the acoustic sound pressure level of the dialog level during the final audio mixing session of the **Main** encoded Dolby digital bit stream. Possible options are in the range of 0 to 31. If you have selected Dual Mono encoding, the **Main** mixing level setting applies to the left channel. The default is 25.

**Note:** In Dual Mono 1+1 mode this setting applies to the **Main** channel (left).

5. Set the **Dialog Normalization**.

Use this field to select how far (measured in dB) the average dialog level is below digital 100% for Stereo 2/0 streams, Mono 1/0 streams, or the main channel of Dual Mono 1+1 streams. The default is -27. The range is from -1 to -31 dB.

**Note:** In Dual Mono 1+1 mode this setting applies to the **Main** channel (left).

6. In Dual Mono 1+1 repeat steps 2 to 5 for the **Aux** channel.

**Note:** These settings apply to the right channel.

7. Click **Apply**.

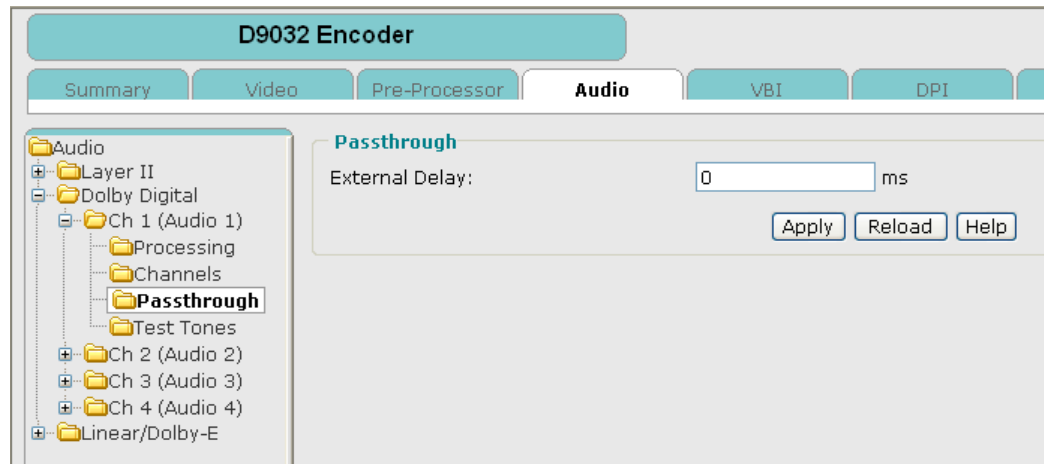
# Setting Up the Dolby Digital Passthrough

---

## To Set Up the Dolby Digital Passthrough

Proceed as follows to set up the Audio Dolby Digital Passthrough:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Dolby Digital icon, expand the **Ch 1, Ch 2, Ch 3** or **Ch 4** icon and click the **Passthrough** icon from the sub-pages.



2. Set the External delay.  
The legal range is from 0 to 2000 ms.  
If you use an external audio encoder which adds to the audio delay, type a delay value corresponding to the external audio delay.
3. Click **Apply**.

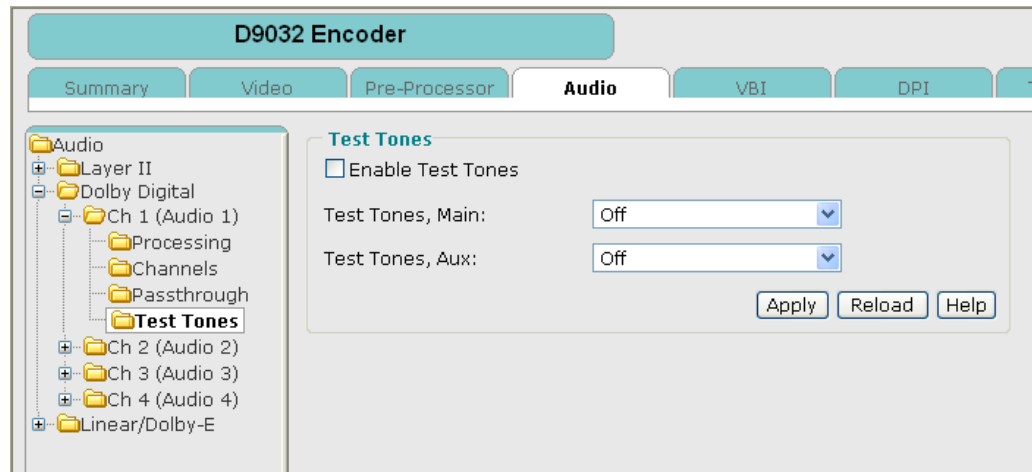
# Setting Up the Dolby Digital Test Tones

---

## To Set Up the Dolby Digital Test Tones

Proceed as follows to set up the test tones:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Dolby Digital icon, expand the **Ch 1, Ch 2, Ch 3** or **Ch 4** icon and click the **Test** icon from the sub-pages.



2. If relevant, set and enable the left and/or right test tones.

**Note:** Test Tones are not applicable when Passthrough of Dolby Digital is selected.

**Note:** When Test Tones Left or Test Tones Right are set to Off the respective channel encodes the incoming signal.

This option determines whether to send a test pattern to the left and/or right channel, and the frequency (Hz or kHz) and amplitude of that test pattern. See the table below for possible options:

## Setting Up Dolby Digital Test Tones, Continued

---

Test Pattern Values	
Frequency	Amplitude (dBFS)
Off	
125 Hz	-1.05
500 Hz	-1.05
1 kHz	-1.05
1 kHz 21 dB	-21.05
1 kHz 61 dB	-61.05
2 kHz	-1.05
10 kHz	-1.05
Silence	

**Note:** Digital Silence is used to create a stream with perfect (or digital) silence.

**Note:** The test tone frequencies apply at a sampling frequency of 48 KHz.

3. Click **Apply**.



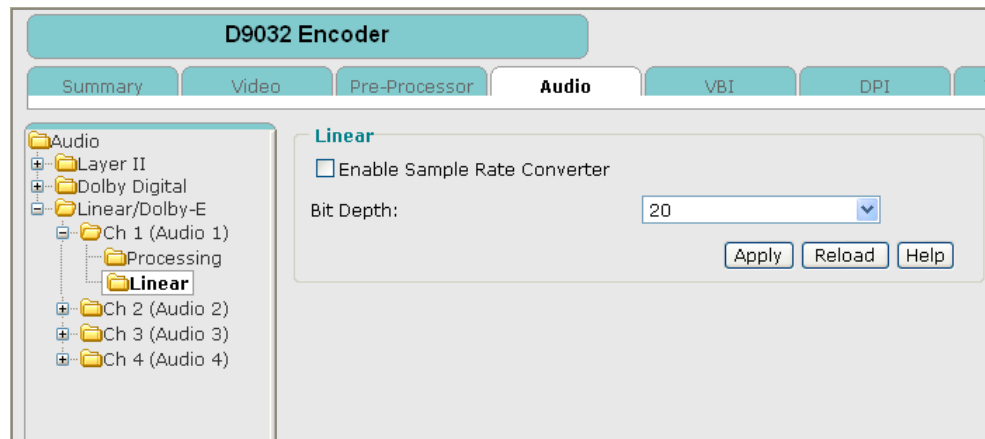
# Setting Up the Linear/Dolby E Audio Input

---

## To Set Up the Linear/Dolby E Audio Input

Proceed as follows to set up the Linear/Dolby E Audio Input:

1. From the user interface of the D9032 Encoder, click the **Audio** tab, expand the Linear/Dolby E icon and click the **Ch 1**, **Ch 2**, **Ch 3** or **Ch 4** icon from the sub-pages.



2. If relevant, enable the audio channel.

**Note:** Enable the audio after you have changed all audio settings if you don't want to transmit the audio while the changes take place.

3. Set the encoding mode.

You may select between Linear and Dolby E.

**Note:** You can transfer Dolby Digital, Dolby E and uncompressed PCM data in the linear channel. This may be useful if you are transferring different types of data. Note however, that only by transferring Dolby-E data in the Dolby E mode, you will be able to receive Dolby E alarms.

4. Select in the **Input Type** field whether your audio input is analog, digital or embedded.

The D9032 Encoder inputs the signal from the Analog/Digital input connector in the selected format. If you select **Embedded**, the D9032 Encoder extracts the audio embedded in the active SDI video signal of the program.

## Setting Up the Linear/Dolby E Audio Input, Continued

---

**Note:** Analog is only applicable to Linear audio where PCM samples are transparently transmitted.

5. Select the analog input impedance.  
Set the input impedance to 600 Ohms if 600 Ohm termination is required in your system. Set the encoder's input impedance to High if the source may not be loaded.
6. Select the digital input impedance.  
Use 110 Ohms if the audio interface is an AES/EBU interface. Use 75 Ohms if the audio interface is an AES-3id interface.
7. Set the analog clipping level.  
The legal range is from -6000 to 24000 mdBu. You typically set the clipping level 6 dB above your maximum program level. So, for a maximum level of 9 dBu, set the clipping to 15000 mdBu. If your maximum level is 15 dBu, set the clipping level to 21000 mdBu. The resolution is 500 mdBu.  
**Note:** You will only get unity gain if you set the clipping level to the same value for the encoder as the maximum output level in the decoder.
8. Set the relative delay.  
The legal range is from -1000 to 1000 ms.  
Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program, which has both.  
**Example:** If you use external video equipment which adds to the video delay, type a negative external audio delay value corresponding to the external video delay.  
**Note:** You cannot set a negative relative audio delay greater than the end-to-end delay determined by the video encoder.
9. Set the External delay.  
The legal range is from 0 to 2000 ms.  
If you use an external audio encoder which adds to the audio delay, type a delay value corresponding to the external audio delay.
10. For embedded audio select the embedded packet pair.  
The SDI video input can contain up to 8 stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to 4 of these channels.
11. Check the bit rate of the signal.
12. Click **Apply**.

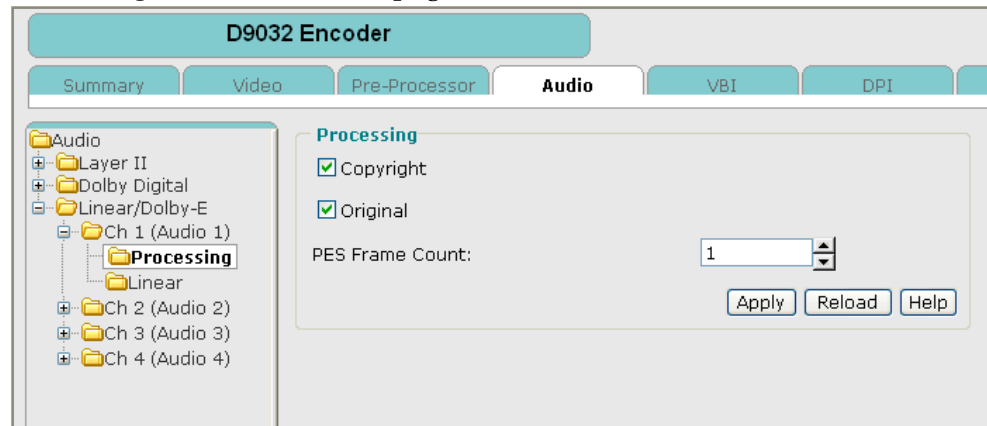
# Setting Up the Linear/Dolby E Processing

---

## To Set Up the Linear/Dolby E Processing

Proceed as follows to set up the Linear/Dolby E Processing:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Linear/Dolby E icon, expand the **Ch 1, Ch 2, Ch 3** or **Ch 4** icon and click the **Processing** icon from the sub-pages.



2. Check the **Copyright** check box if you want to signal that the encoded bit stream is protected by copyright. The copyright has the same meaning as the copyright bit on CDs and DAT tapes, i.e., that it is illegal to copy the contents if the bit is set.  
This box is checked per default.
3. Check the **Original** check box if you want to signal that the encoded bit stream is located on its original media.  
This box is checked per default.
4. Set the PES Frame Count.  
This figure denotes the number of audio frames per PES packet. The legal range is from 1 to 8. The default value is 1.
5. Click **Apply**.

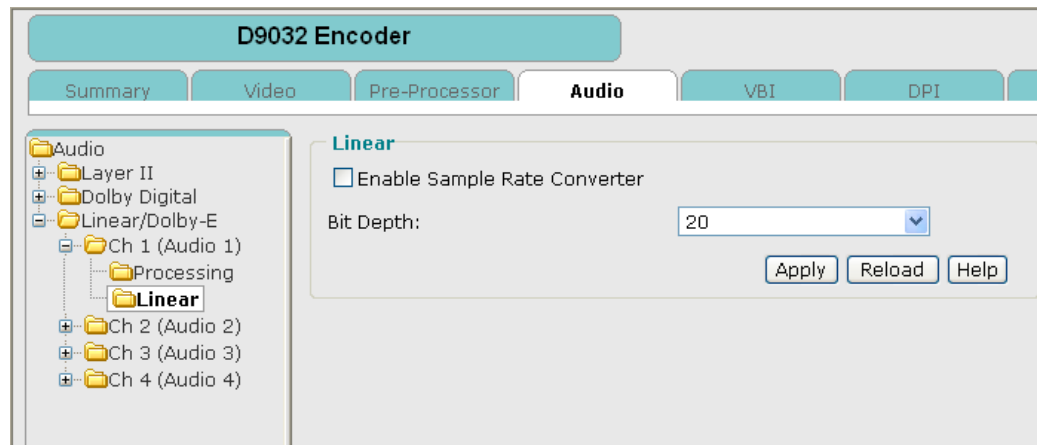
# Setting Up the Linear/Dolby E Linear Parameters

---

## To Set Up the Linear/Dolby E Linear Parameters

Proceed as follows to set up the Linear/Dolby E linear parameters:

1. From the user interface of the D9032 Encoder click the **Audio** tab, expand the Linear/Dolby E icon, expand the **Ch 1, Ch 2, Ch 3** or **Ch 4** icon and click the **Linear** icon from the sub-pages.



2. If relevant, enable the sample rate converter.  
Enable the sample rate converter if your source is not synchronized to the D9032 Encoder.
3. Set the bit depth.  
The sample rate is 48 kHz. You may select between 16, 20 and 24 bits.  
**Note:** The bit depth setting is only applicable for linear mode. The bit depth is always 20 bits in the Dolby-E mode.
4. Click **Apply**.

## Section G - Setting Up the VBI

### Selecting VBI Source and Enabling VBI Resources

---

#### Overview

From the VBI tab page you select the VBI data that you want to transfer from the incoming video signal to the outgoing transport stream.

**Note:** Besides selecting the VBI data you must also enable the lines in which the VBI data reside for the data to be transferred. For further information, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81 and **Setting Up the VBI Lines in 525 Lines Systems**, page 5-83.

#### Different VBI PIDs

The following different VBI PIDs exist and may be transferred simultaneously:For

Name of PID	VBI Contents
DVB-VBI	DVB-VBI, Teletext, ETSI WSS, AFD WSS, VPS, transparent lines in DVB-VBI format
EBU Teletext	EBU-formatted teletext
Transparent lines	Transparent lines in proprietary format

information about how much bandwidth the various VBI tributaries use in the transport stream, see Appendix B - Transport Stream Rates.

## Selecting VBI Source and Enabling VBI Resources, Continued

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### Restrictions on VBI Lines to be Transferred When Pre-Processing is Enabled

With low bit rates the end-to-end delay (from encoder to decoder) rises. This may cause encoder-internal VBI buffer overflow. To avoid this you need to follow certain restrictions with regard to the number of VBI lines to be transferred.

The following table shows that a minimum video bit rate results in a given end-to-end delay, which again causes the restrictions on the maximum number of transparent lines per field to be transferred.

The example presupposes that you have

- enabled pre-processing,
- 8 teletext lines per field, and
- no other VBI.

The example covers both 625 and 525 lines systems.

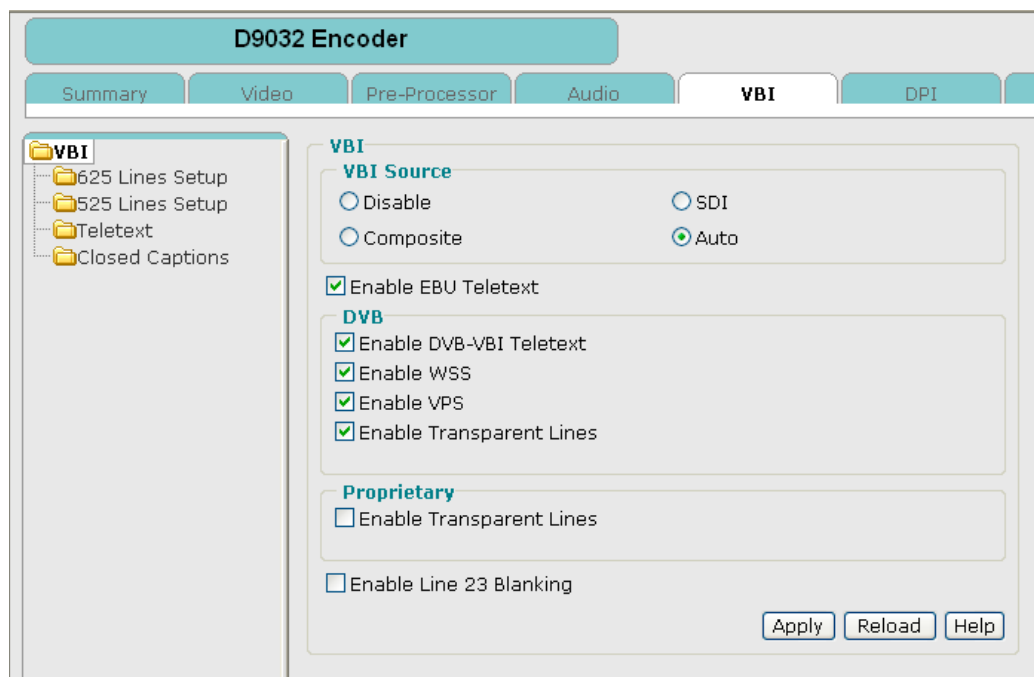
Minimum Video Bit Rate with Pre-processing	End-to-End Delay	Maximum Number of Proprietary Transparent Lines per Field
3.8 Mbit/s	1.0 s	4
2.4 Mbit/s	1.3 s	3 in one field and 4 in the other
1.9 Mbit/s	1.5 s	3
1.6 Mbit/s	1.7 s	2 in one field and 3 in the other
1.3 Mbit/s	2.0 s	1

## Selecting VBI Source and Enabling VBI Resources, Continued

### To Select VBI Source and Enable VBI Resources

Proceed as follows to select VBI source and enable VBI resources:

1. From the user interface of the D9032 Encoder click the **VBI** tab and the **VBI** icon from the sub-pages.



**Important:** Depending on your hardware configuration and enabled video input various features are selectable.

Module Options	Available Features
Adv. Video Input (high-quality composite and/or SDI)	All. For Teletext you may control whether there is EBU teletext or DVB-VBI teletext in each individual line.
None (basic composite encoder)	Closed Captions.
ClearSight and/or SDI	All except VITC. You may control whether there is DVB-VBI teletext in each individual line.

## Selecting VBI Source and Enabling VBI Resources, Continued

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2. Select the VBI source.

The source may be **SDI**, **Composite**, **Auto** or **Disable**. **Auto** means that the VBI is taken from the active video source. With the VBI source feature you may for example take VBI from the composite input and video from the SDI input or vice versa. To do this the two signals must be field-locked within  $\pm 5$  lines.

**Important:** Closed captions are set up separately on the Closed captions sub-page and extracted from the active NTSC or 525 lines SDI video input signal.

**Note:** If the source is SDI the VII will always be enabled.

3. If required, enable the EBU Teletext.

Teletext in the video input will be sampled and transferred to the outgoing data stream as a separate stream, i.e. with its own PID marked to contain Teletext.

4. If required enable DVB-VBI Teletext.

**Note:** DVB-VBI Teletext and EBU Teletext can be transferred simultaneously. For information on the usable lines, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81.

5. If required, enable the WSS.

The Wide Screen Signaling (WSS) is used for signalling the intended aspect ratio to receivers. For information on how to set up the WSS, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81.

6. If required, enable the VPS.

The Video Program System (VPS) is used for accurate video recording as the recording is not started until a specific program identifier code is found in the incoming video signal.

For information on how to set up the VPS, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81.

7. If required, enable the DVB Transparent Lines format **or** the Proprietary Transparent lines.

For information on the usable lines, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81.

8. If required, enable Line 23 Blanking.

Line 23 blanking is used to clear the first active line (line 23). This is useful when you use an input signal with WSS. WSS is placed in the first half of line 23, and is encoded as video data. If WSS is not reinserted in the decoder, the decoded WSS will be sent to the monitor. Some monitors have problems, with this decoded WSS signal. A solution to this problem is to blank line 23 in the encoder.

For information on how to set up the Line 23 Blanking, see **Setting Up the VBI Lines in 625 Lines Systems**, page 5-81.

9. Click **Apply**.

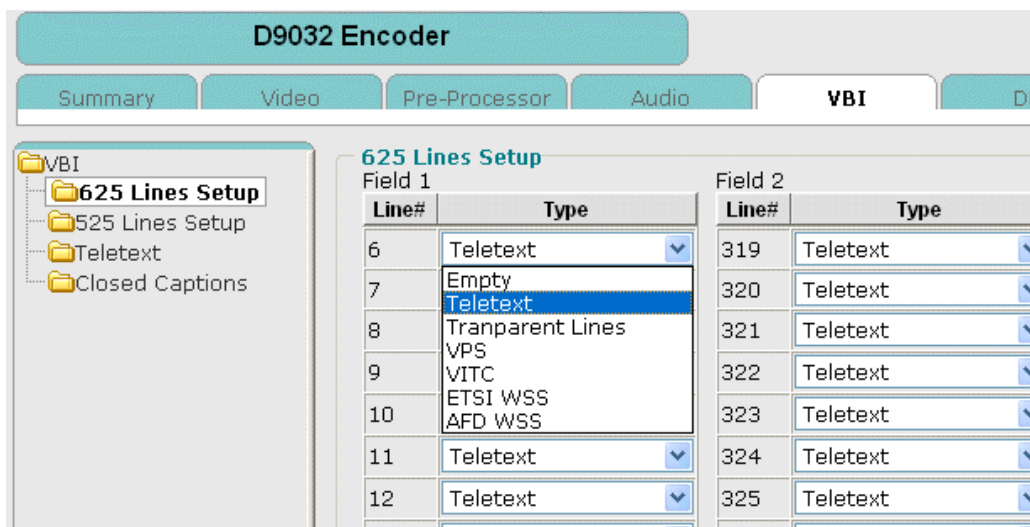


# Setting Up the VBI Lines in 625 Lines Systems

## To Set Up the VBI Lines in 625 Lines Systems

Proceed as follows to set up VBI lines in 625 lines Systems:

1. From the user interface of the D9032 Encoder click the **VBI** tab and the **625 Lines Setup** icon from the sub-pages.



2. Click on the fields to activate the drop-down menu of the various lines with VBI data and select the data type.

**Hint:** You must also enable the VBI resource for the data to be transferred. See **Selecting VBI Source and Enabling VBI Resources**, page 5-77.

## Setting Up the VBI Lines in 625 Lines Systems, Continued

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The following table shows the location of the possible VBI data and the possible maximum number of selectable lines per field:

VBI Data	Location, Line	Max. No. of Selectable Lines
Teletext	7 to 22 and 320 to 335	16 per field
Transparent Lines, (DVB)	7 to 23 and 319 to 335	2 per field. 1 per field if VPS/WSS or DVB-VBI Teletext is enabled
Transparent Lines, (Proprietary)	6 to 23 and 319 to 335	4 per field
VPS	16	1
VITC	6-22 and 319 to 335	1 per field
ETSI WSS	23	1
AFD WSS	23	1

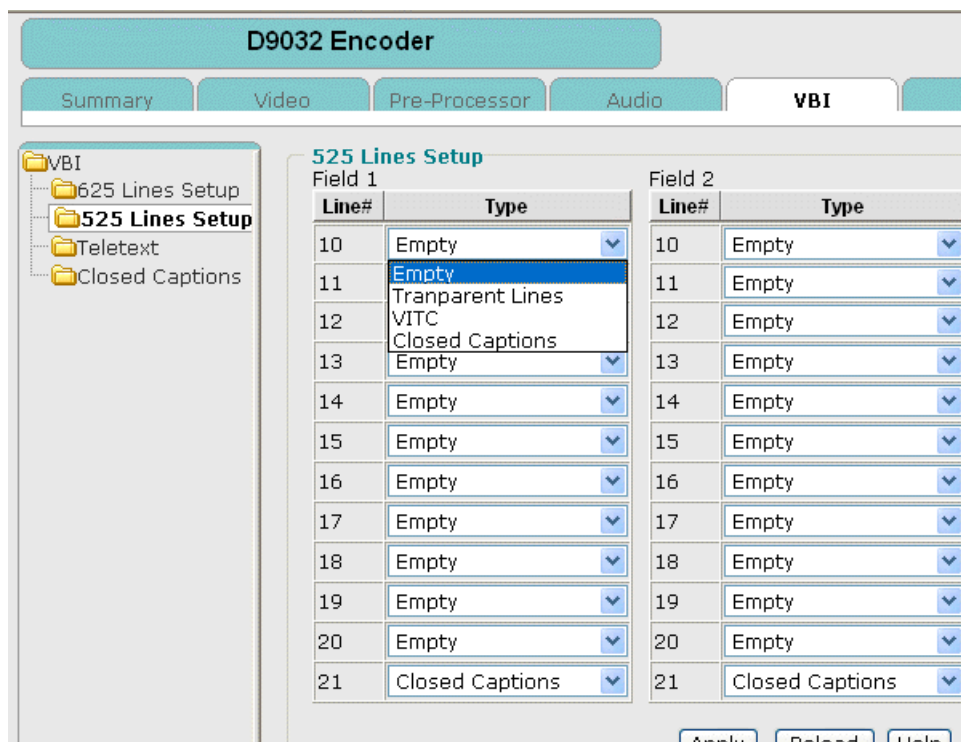
3. Click **Apply**.

# Setting Up the VBI Lines in 525 Lines Systems

## To Set Up the VBI Lines in 525 Lines Systems

Proceed as follows to set up VBI lines in 525 lines Systems:

1. From the user interface of the D9032 Encoder click the **VBI** tab and the **525 Lines Setup** icon from the sub-pages.



2. Click on the fields to activate the drop-down menu of the various lines with VBI data and select the data type.

**Important:** You must also enable the VBI resource for the data to be transferred. For further information, see **Selecting VBI Source and Enabling VBI Resources**, page 5-77.

The following table shows the VBI data, the lines in which it may be located and the maximum number of selectable lines:

Data	Lines	Max. Number of Lines
Transparent Lines, Proprietary	10 to 22 field 1 and 10 to 22 field 2	4 per field
VITC	10 to 20 and 273 to 282	1 per field
Closed Captions	21 fields 1 and 2	1 per field

3. Click **Apply**.

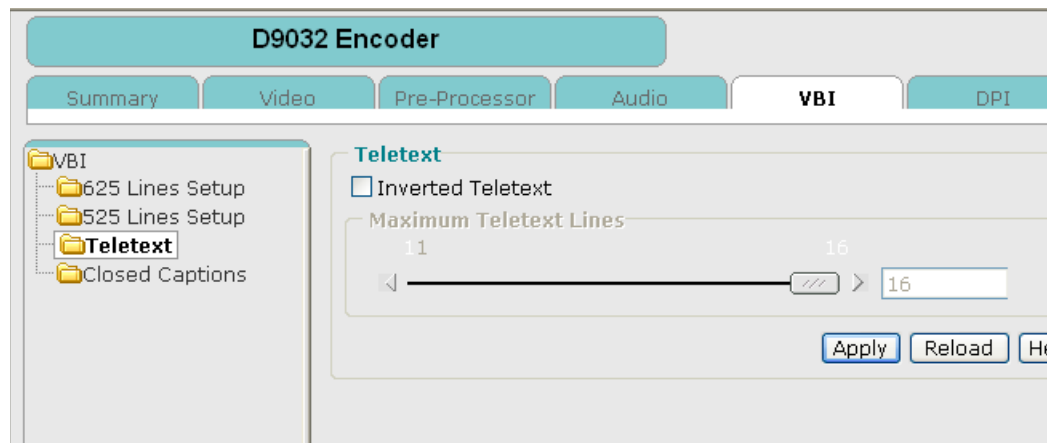
# Setting Up the Teletext

---

## To Set Up the Teletext

Proceed as follows to set up the Teletext:

1. From the user interface of the D9032 Encoder click the **VBI** tab and the **Teletext** icon from the sub-pages.



2. Unless you have specific requirements, don't check the **Inverted Teletext** box. When you check the **Inverted Teletext** box the D9032 Encoder accepts inverted framing words. Typically, inverted framing words are found in the teletext data when you use the teletext system for transmission of proprietary data. Inverted Teletext is discarded by the TV sets.

**Note:** Inverted teletext is processed and sent together with normal teletext according to the standard EN 300 472. It is not marked to be inverted teletext in the transport stream as specified in the DVB VBI standard EN 301 775.

3. For encoders with the ClearSight or SDI module, set the maximum number of EBU teletext lines to be transmitted from the input signal. You set this to 16 unless you have specific requirements.

**Important:** The Maximum Teletext Lines setting is grayed out if you have installed the Adv. Video Input board. In this case you set up both the DVB-VBI and EBU teletext lines under the 625 lines setup page.

**Note:** The 16 lines denote a maximum of 16 lines per field, i.e., 32 lines. When using this method of transferring teletext you don't use the 625 Lines Setup. In stead every line is examined and if it contains teletext it is transferred. If it doesn't contain teletext or is specified to contain transparent lines it is not transferred. The lowest lines in field one will be transmitted first and then the lowest lines in field two.

## Setting Up the Teletext, Continued

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**Hint:** In certain situations you may want to limit the number of teletext lines. You may have a tight bit rate budget and an input which occasionally has additional teletext lines. By limiting the number of teletext lines to be transferred you can prevent any additional teletext lines from damaging your output.

**Note:** **Available Rate on the Transmission Media**, page C-16 shows the payload in the TS for different maximum numbers of teletext lines.

4. Click **Apply**.

## Setting Up the Output Formats for Closed Captions

---

### Overview

The D9032 Encoder is capable of transferring closed captions and Content Advisory (CA) data from the incoming video signal to the outgoing transport stream. CA data carries program rating information and enables a TV-set to block displaying of a television program depending upon its rating. The rating system is also known as Content Advisory “TV Parental Guidelines”. In the decoder this is known as v-chip support.

Format	Description
None	Closed captions and CA data are not transferred.
EIA-708 ATSC	Format according to CEA-708-B, Digital Television (DTV) Closed Captioning, December 1999
EIA 708 SA Proprietary	This is the EIA 708 format with proprietary Scientific Atlanta header information. To be used with decoders supporting this format.

The D9032 Encoder supports simultaneous transfer of three different output formats for closed captions:

Format	Description
None	Closed captions and CA data are not transferred.
EIA 708	Format according to EIA-708-B, Digital Television (DTV) Closed Captioning, December 1999
SA Type 4	This is a Scientific Atlanta proprietary format and is used by PowerVu decoders.
DVS 157	Formerly known as the Motorola GI format.

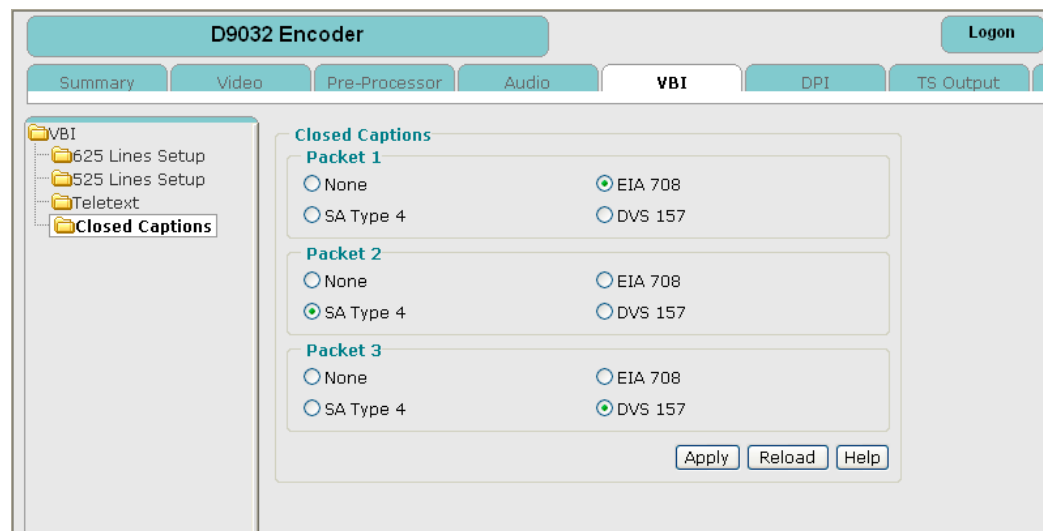
## Setting Up the Output Formats for Closed Captions, Continued

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### To Set Up the Output Formats for Closed Captions

Proceed as follows to set up the output formats for Closed Captions:

1. From the user interface of the D9032 Encoder click the **VBI** tab and the **Closed Captions** icon from the sub-pages.



2. Select the desired output format of the closed captions for the packet(s) to be generated.

**Note:** If you have a mixed bouquet of decoders accepting different formats for closed captions, you can simultaneously transfer up to three formats in packet number order in the outgoing transport stream.

**Hint:** If your decoder doesn't accept the selected format, it may be a good idea to rearrange the order in which the formats are transferred. For example, some decoders only accept closed captions in packet one.

The default setting is None. Closed captioning is only supported for 525 lines NTSC and 525 lines SDI.

3. Click **Apply**.

## Section H - Digital Program Insertion (DPI)

### Setting Up the DPI

---

#### Overview

Digital Program Insertion (DPI) makes it possible to insert advertisements into program content in the digital domain. The DPI messages supported in D9032 Encoder are in accordance with the SCTE 35 specification.

#### To Set Up the DPI

Proceed as follows to set up the DPI:

1. From the user interface of the D9032 Encoder click the **DPI** tab.

The screenshot displays the 'D9032 Encoder' user interface with the 'DPI' tab selected. The interface is organized into several sections:

- DPI ES:** Contains a checkbox for 'Enable', a 'PID' field with the value '1191', a 'Bandwidth Reservation Bit Rate' field with the value '0' and unit 'bit/s', and a 'Heartbeat Packet Interval' field with the value '0' and unit 'seconds'.
- Splice Information:** Includes fields for 'Event Source' (0), 'Program ID' (1000), 'Avail Count' (0), 'Avail' (0), 'Provider ID' (0), and 'Event Number' (1). There is also an unchecked checkbox for 'Enable Provider ID'.
- Trigger Information:** Features a 'Use DTMF' checkbox, 'Start Trigger' (Open Input 1), 'Stop Trigger' (Off), and two 'DTMF' input fields. It also includes 'Pre-roll Delay' fields with values '6000 ms' and '0 ms'.

At the bottom right of the configuration area are three buttons: 'Apply', 'Reload', and 'Help'.

2. Enable the DPI ES.

The DPI elementary stream describes the DPI.

3. Set PID of the DPI.

This is the transport packet PID of the DPI stream. You may type a figure in the range from 81 to 8190. Observe that you may not use the same PID for any other element.



## Setting Up the DPI, Continued

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4. Set the Bandwidth Reservation Bit Rate.

The bandwidth reservation bit rate describes the packet bandwidth of the DPI stream in bits per second. Possible range is 1540 to 35000 bit/s and 0.0 disables the reservation of a fixed bandwidth for DPI.

**Note:** The bandwidth reservation bit rate is typically used in connection with encryption of the encoded signal so that the splice cannot be detected.

5. Set the Heart Beat Duration Period.

The heart beat is used to signal a live DPI PID connection.

Possible range is from 0 to 3600 seconds between heart beat packets.

**Note:** Typically you won't need the heartbeat duration setting if you have set the bandwidth reservation bit rate to something different from 0.

6. Set up the Event Source.

This is the Event Source ID for the alternate program to be inserted. The legal range is from 0 to 15. The default is 0.

7. Set up the Event Number.

This number indicates together with the Event Source the unique identification of the program to be inserted. The legal range is from 0 to 268435455.

8. Set up the Program ID.

This indicates the ID of the alternate Program to be inserted. The legal range is from 0 to 65535.

9. Set up the Avail Count.

This parameter represents the expected maximum number of breaks, e.g. advertisements, in the program. Entering 0 means that the parameter is not used. The legal range is from 0 to 255.

10. Set up the Avail.

The Avail parameter is the counter for breaks, e.g., advertisements, in the program. The counter starts as 1 and you must increment it for each new break period until a new program starts. Entering 0 means that the parameter is not used. The legal range is from 0 to 255.

11. Set up the Provider ID.

This is the unique ID of the provider of the program. The legal range is from 0 to 4294967295.

12. Enable the Provider ID.

Enabling this means that the Provider ID is sent as part of the DPI message.

13. If relevant, check the Use DTMF check box.

This indicates that you use DTMF tones as start and stop triggers for DPI. Don't check the box if you want to use the contact closure inputs to trigger DPI.

## Setting Up the DPI, Continued

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14. Select the contact closure Start Trigger, or  
This indicates the input number and the position (open/high or closed/low) of the contact closure input to start the generation of the DPI. Possible inputs are 1 to 8.
15. Type the DTMF tone Start trigger.  
This indicates the tone(s) that will initiate the generation of a start DPI package. You may enter up to 8 tones. Possible values are 0 to 9, a, b, c, d, A, B, C, D, # and \*.
16. Select the contact closure Stop Trigger, or  
This indicates the input number and the position (open/high or closed/low) of the contact closure input to stop the generation of the DPI. Possible inputs are 1 to 8 and Off.
17. Type the DTMF tone Stop Trigger.  
This indicates the tone(s) that will initiate the generation of a stop DPI package. You may enter up to 8 tones. Possible values are 0 to 9, a, b, c, d, A, B, C, D, # and \*.
18. Set the Pre-roll Delay for the Start Trigger.  
This feature allows splicers to delay requests to the ad server in order to accommodate play out equipment latency in the system. Possible values are in the range of 0 to 60000 ms. The default value is 5000 ms.
19. Set the Pre-roll Delay for the Stop Trigger.  
This sets the time delay required prior to the Stop trigger initiating due to equipment latency. Possible values are in the range of 0 to 60000 ms. The default value is 0 ms.
20. Click **Apply**.

# Section I - Setting Up the TS Output

## Setting Up the TS Output Parameters

### To Set Up the TS Output Parameters

Proceed as follows to set up the TS Output:

1. From the user interface of the D9032 Encoder click the **TS Output** tab and the Transport Stream icon from the sub-pages.

The screenshot shows the 'D9032 Encoder' user interface. At the top, there are tabs for 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', and 'DPI'. The 'TS Output' tab is selected. On the left, a tree view shows 'TS Output' expanded, with sub-items 'ASI', 'IP Streaming', and 'PCR Synchronization'. The main area displays the 'TS Output' configuration. It includes a text input for 'Output Bit Rate' set to '10,000,000' with 'bit/s' as the unit. Below this is the 'Output Format' section with two radio buttons: '188' (selected) and '204 RS On'. There is also a '204 RS Off' option. At the bottom, there is a dropdown menu for 'Disable Output when Backup is Required' set to 'Yes'. 'Apply', 'Reload', and 'Help' buttons are at the bottom right.

2. Type the output bit rate in bit/s.  
The legal range is from 1 to 64 Mbit/s. This bit rate must not be smaller than the Used Payload.
3. If required, apply Reed Solomon error correction codes to your output. Select 188 or 204 bytes mode.

The value must be the same in the encoder and the decoder.

Format	Meaning
188	188 bytes mode without Reed Solomon algorithm.
204 RS OFF	204 bytes mode without the Reed Solomon algorithm applied. This means that there is <b>RS</b> overhead but only with dummy bytes.
204 RS ON	204 bytes mode with Reed Solomon algorithm for ASI outputs. For IP outputs there is no Reed Solomon algorithm.

**Note:** If you use a modulator you should switch off the RS error correction.

4. If relevant, select Disable Output when Backup is required.  
If you select "Yes" and check the Trigger Backup box (on the System/Message page) for the event in question, the ASI and IP outputs will be disabled when the backup trigger alarm occurs.

**Note:** The output on the monitor port will not be disabled.

5. Click **Apply**.

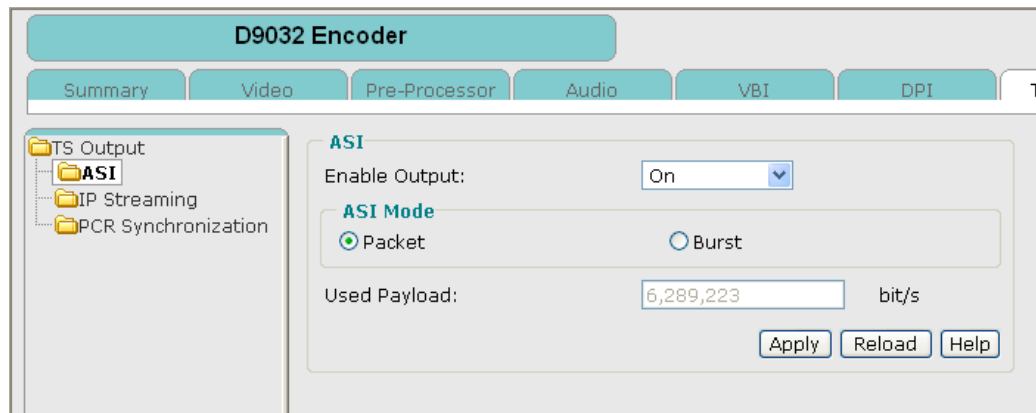
# Setting Up the ASI Output Parameters

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## To Set Up the ASI Output Parameters

Proceed as follows to set up the ASI Output:

1. From the user interface of the D9032 Encoder click the **TS Output** tab and the ASI icon from the sub-pages.



The GUI displays the bit rate of the used payload if you press **Reload**. If the D9032 Encoder is set up to run in statmux mode the Used Payload readout is based on the Default Video Rate.

For information on how to make your own bit rate budget, see **Making a TS Rate Budget**, page 5-21.

2. Select **On**, **Off** or **Null Packets**.  
Under normal operation, you should verify that the output is set to **On**. The output may have been set to **Off** by the ROSA Element manager. For further information refer to the *ROSA - Element Manager - User's Guide, part number 64005743*. Null Packets implies that null packets will be transmitted in the transport stream at the given bit rate.
3. Select the ASI mode **Packet** unless you have specific requirements.  
Select between the 2 DVB transmission modes for ASI. In Packet mode, you send a whole MPEG packet together (188/204 bytes) with stuffing in between packets. In Burst mode, you send 1 byte at a time with stuffing in between. Some non-Scientific Atlanta decoders specifically require Packet or Burst mode.
4. Click **Apply**.

# Setting Up the IP Streaming Parameters

## To Set Up the IP Streaming Parameters

Proceed as follows to set up the IP streaming parameters:

1. From the user interface of the D9032 Encoder click the **TS Output** tab and the **IP Streaming icon** from the sub pages.

The screenshot shows the D9032 Encoder web interface. At the top, there's a header bar with 'D9032 Encoder' and buttons for 'Login' and 'Help'. Below this is a navigation bar with tabs: 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', 'DPI', 'TS Output' (selected), 'PSI', and 'Syst'. On the left side, there's a tree view under 'TS Output' with sub-items: 'ASI', 'IP Streaming' (selected), and 'PCR Synchronization'. The main content area is titled 'IP-Streaming'. It contains a 'Mode' dropdown set to 'Disable', an 'Enable Backup' checkbox, and two columns for 'Main' and 'Backup' receiver settings. The 'Main' column has fields for MAC (00-50-4b-00-11-22), IP (0.0.0.0), Port Number (666), TTL (128), and Number of TS-Packets (7). The 'Backup' column has fields for MAC, IP (0.0.0.0), Port Number (666), and a checked 'Maintain TS Rate' checkbox. At the bottom right are 'Apply', 'Reload', and 'Help' buttons.

2. From this page you set up the IP parameters for the main receiver as well as a backup receiver. For information about how to set up the IP parameters of the D9032 Encoder IP TS Out connector and Aux connector, see **Setting Up the IP Networking**, page 5-137.
3. Select UDP from the Mode select box to enable IP streaming.  
Depending on the status of Enable Backup box this setting enables IP streaming on one or two ports as described in the next step.
4. Check the Enable Backup box to automatically stream IP packets to the backup receiver as well.  
**Note:** Data is streamed to the backup receiver from the Aux connector.  
If the Enable Backup box is unchecked and the Mode described above is UDP, IP streaming is only enabled to the main receiver.  
**Note:** Data is streamed to the main receiver from the IP TS Out connector.
5. Type the MAC address of the receiver of IP streaming packets.  
The MAC address implies unicast streaming.

## Setting Up the IP Streaming Parameters, Continued

---

6. Type the IP address of the receiver of IP streaming packets.  
IP multicast addresses (class D) must, for practical reasons, be in the range from 224.0.1.0 to 239.255.255.255. Addresses outside this range are used for broadcast or unicast services.
7. Type the destination port of the receiver of IP streaming packets.
8. If relevant, repeat steps 4 to 6 for the backup receiver.
9. Type the TTL (Time To Live)  
TTL is a value in an Internet Protocol (IP) packet that tells a network router whether or not the packet has been in the network too long and should be discarded. You specify the number of hops. The legal range is from 0 to 255. The default value is 128.
10. Set the number of TS Packets to 7 unless you have specific requirements.  
Use a lower value if data is passed through transmission equipment where the MTU is lower than 1470 bytes. The legal range is from 1 to 7. The default value is 7. The following table shows the maximum MTU sizes for the various TS packets at 188 byte and 204 byte output format respectively. For further information on output formats, see **Setting Up the ASI Output Parameters**, page 5-92.

No. of TS Packets	Maximum MTU Size (Bytes) In UDP Mode	
	188 Bytes Mode	204 Bytes Mode
1	230	246
2	418	450
3	606	654
4	794	858
5	982	1062
6	1170	1266
7	1358	1470

## Setting Up the IP Streaming Parameters, Continued

Use the following table to find the IP overhead for the various number of TS packets per IP packet in 188 byte and 204 byte mode respectively.

No. of TS Packets	IP Overhead in%	
	188 Bytes Mode	204 Bytes Mode
1	22.4	20.6
2	11.2	10.3
3	7.5	6.9
4	5.6	5.2
5	4.5	4.2
6	3.8	3.5
7	3.2	3.0

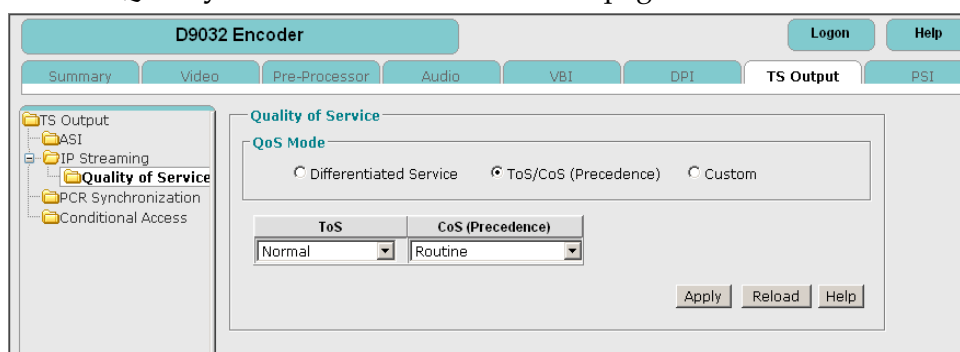
11. Uncheck the Maintain TS Rate box if your receiver can handle non-constant TS rates.

Maintain TS Rate means that your are transmitting null-packages in the IP output so that the transmitted rate is equal to the ASI output rate. By unchecking this box, null packets are not transmitted in the IP stream.

**Note:** You should enable this when PCR-jitter is a critical parameter.

12. Click **Apply**.

13. Click the **Quality of Service** icon from the sub-pages.

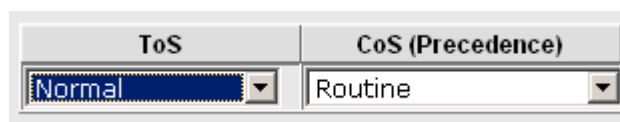


14. Choose the desired quality of service (QoS Mode; either Differentiated Service, ToS/CoS (Precedence) or Custom. The default is ToS/CoS Precedence. These settings are used to guide the selection of the actual service parameters when transmitting data through a network.

## Setting Up the IP Streaming Parameters, Continued

---

- Set the CoS (Precedence) mode settings. Some networks offer service precedence, which treats high precedence traffic with a higher priority than other traffic (by accepting only traffic above a certain precedence at the time of high load). Choose from Routine, Priority, Immediate, Flash, Flash Override, Critic ECP, Internetwork Control or Network Control. The default is Routine.

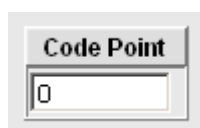


The image shows a configuration window with two dropdown menus. The first menu is labeled 'ToS' and has 'Normal' selected. The second menu is labeled 'CoS (Precedence)' and has 'Routine' selected.

- Each of the three available modes and the RFC (Request for Comment) references to set these modes are described in the following table.

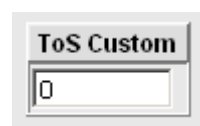
Mode	Description
Differentiated Service	Refer to RFC 2474 and RFC 3260. Supports configuration of TOS bits in the IP header, allowing integration in Diff Serve networks.
ToS/CoS (Precedence)	Type of service precedence. Refer to RFC 791.
Custom	Refer to RFC 3168.

- Set the CoS (Precedence) mode settings. Some networks offer service precedence, which treats high precedence traffic with a higher priority than other traffic (by accepting only traffic above a certain precedence at the time of high load).
- When you select Differentiated Service as the QoS mode, you need to set the Differentiated Service “Code Point” (DSCP) for the stream. The Code Point is a 6-bit field which indicates the type of service the packet carries when the encoder is connected to a router (i.e., to set the priority).



The image shows a configuration window titled 'Code Point' with a text input field containing the value '0'.

- When you select Custom as the QoS Mode, set the 8-bit field that contains the QoS bits. This value is a multiple of the value set for the Differentiated Service Code point.



The image shows a configuration window titled 'ToS Custom' with a text input field containing the value '0'.

15. Click **Apply**.



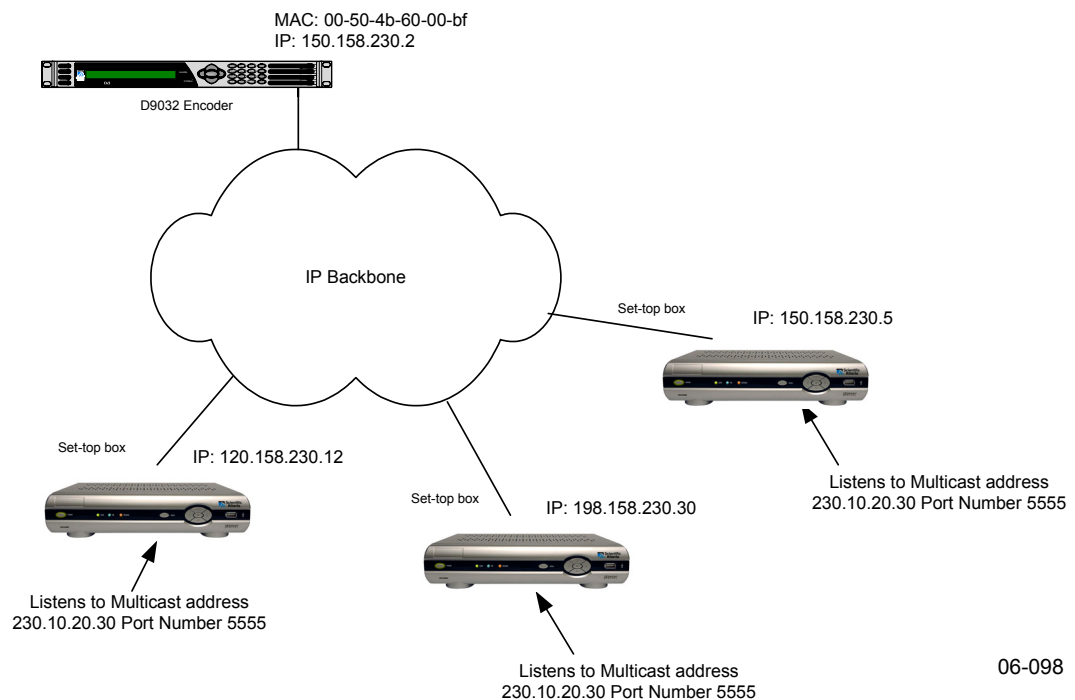
# Streaming Video to Many Set-top Boxes (Multicasting)

## Typical Distribution Scenario

IP multicasting is a concept where the transmitter (here the D9032 Encoder) can transmit one IP packet that will be received by many receivers (here the Explorer 2000 set-top boxes) on several subnets. Multicasting is only a matter of transmitting the IP packets with a special dedicated IP address (called the multicast IP address) and MAC address.

For multicasting to work properly, it is only a matter of configuring the receivers (set-top boxes) with that same multicast IP address (and having set up the IP network with proper routing).

IP multicast addresses (class D) must, for practical use, be in the range from 224.0.1.0 to 239.255.255.255. A typical multicast IP address could for example be 230.10.20.30.



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## Streaming Video to Many Set-top Boxes (Multicasting), Continued

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### Setup in the D9032 Encoder ROSA/Web Interface

Given an IP multicast address, it also determines the MAC address absolutely. The encoder automatically uses the correct multicast MAC address when configuring it with a multicast IP address. In that case, the configured MAC address is not used, so just leave it as is:

Parameter	Setting
Mode	UDP
MAC	00-ab-10-11-12-13 (Not used)
IP	230.10.20.30
Port Number	5555

# Setting Up the PCR Synchronization

## Requirements

PCR synchronization between encoders will only work if:

- the video sources fed to each encoder are all running the same video clock and the encoders have switched off the internal frame synchronizer, **or**
- all encoders are fed with the same video reference signal and the encoders have set the frame synchronizer to use the external video clock as reference

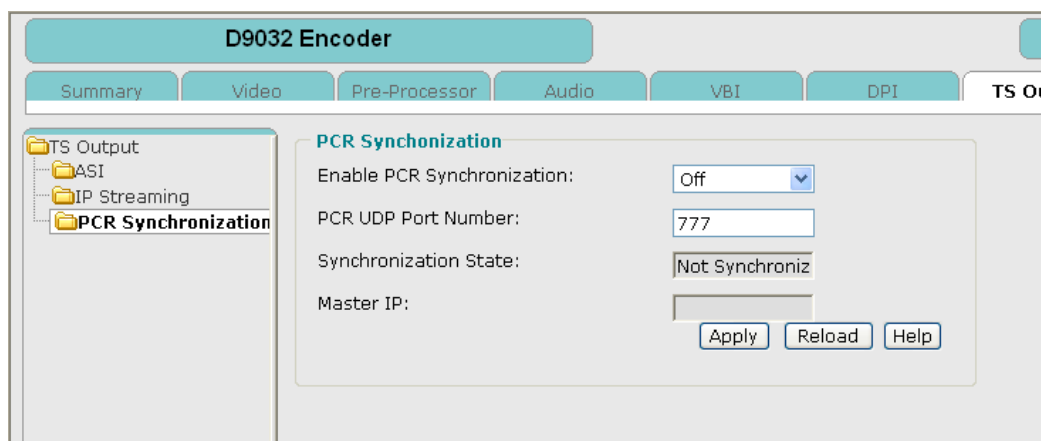
**Note:** If you want several encoders to share resources you must consider whether the delay for all encoders should be identical. If so, consult **Reduced Delay Guidelines**, page 5-29 to see which settings that influence the delay. Also notice that the type of input board, i.e. the ClearSight, the onboard and the SDI video input module has an influence on the delay. If modules or settings influencing the delay are different, you can, via the GUI, manually set the same delay for all encoders participating in PCR synchronization by reducing the maximum delays.

**Important:** You cannot use IP streaming on the AUX switch and PCR synchronization simultaneously. In the PCR synchronization scenario the data from the Aux connector must be sent to a switch or hub which is not connected to the Management port. Via this dedicated and isolated local area network the clock master distributes the clock to the other encoders.

## To Set Up the PCR Synchronization

Proceed as follows to set up the PCR Synchronization:

1. From the user interface of the D9032 Encoder click the **TS Output** tab and the **PCR Synchronization** icon from the sub pages.



The screenshot shows the D9032 Encoder GUI. At the top, there's a title bar 'D9032 Encoder'. Below it, a tabbed interface with 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', 'DPI', and 'TS Output'. The 'TS Output' tab is selected. On the left, a tree view shows 'TS Output' expanded, with sub-items 'ASI', 'IP Streaming', and 'PCR Synchronization' (highlighted). The main area displays the 'PCR Synchronization' settings. It includes a dropdown for 'Enable PCR Synchronization' set to 'Off', a text field for 'PCR UDP Port Number' set to '777', a status field for 'Synchronization State' showing 'Not Synchroniz', and a text field for 'Master IP'. At the bottom right are 'Apply', 'Reload', and 'Help' buttons.

From this page you can synchronize the program clocks of encoders in a network. The GUI automatically displays the synchronization state of the encoder which can be Master, Synchronized or Not Synchronized. The IP address of the Management port of the Master is automatically displayed.

## Setting Up the PCR Synchronization, Continued

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2. Select On, Off or Slave Only.

You select On if you want the encoder in question to be part of the PCR pool. All encoders set to On in the pool will negotiate and one will automatically be granted the state of master. The master is the PCR clock master which distributes the clock to the other encoders which will be slaves. If the master is disconnected from the network one of the other encoders that are set to On will automatically take over the role as master.

**Note:** At least one encoder in the pool must be set to On otherwise there will be no master.

3. Perhaps you don't consider the backup encoder a reliable clock reference in all situations. In such situations you set it to Slave Only. In another scenario you may consider one encoder as particularly trustworthy. This may be because this encoder is directly cabled to the video reference clock or it is closest to the switch or hub. You then set this encoder to Master, by selecting On and the others to Slave Only.
4. Type the PCR UDP Port Number.  
All encoders with the same port number participate in the same PCR pool if they are set to On or Slave Only as described above. The legal range is from 1 to 65535.
5. Click **Apply**.

# Setting Up the Conditional Access Parameters

## To Set Up the Conditional Access Parameters

**Note:** BISS-related settings are not stored in the exported settings file. Hence they cannot be cloned from one device to another, e.g., in backup scenarios.

Proceed as follows to set up the conditional access parameters:

1. From the user interface of the D9032 Encoder click the **TS Output** tab and the Conditional Access icon from the sub-pages.

The screenshot shows the D9032 Encoder's user interface. At the top, there's a header bar with the title 'D9032'. Below it, a navigation bar contains tabs for 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', and 'DPI'. The 'TS Output' tab is selected, and within it, the 'Conditional Access' sub-tab is active. On the left side of the 'Conditional Access' panel, there's a tree view showing a hierarchy: 'TS Output' > 'ASI' > 'IP Streaming' > 'PCR Synchronization' > 'Conditional Access'. The main area of the 'Conditional Access' panel is titled 'BISS' and contains several configuration fields: 'BISS Mode:' with a dropdown menu set to 'BISS-0 (Scrambling Off)'; 'Session Word (BISS-1):' with a text input field containing '000000048378'; 'Clear Session Word (BISS-E):' with a text input field filled with dots; 'Encrypted Session Word (BISS-E):' with a text input field filled with dots; 'Injected ID (BISS-E):' with a text input field filled with dots; and 'Download MCT Application:' with a 'Download' button. At the bottom right of the panel, there are three buttons: 'Apply', 'Reload', and 'Help'.

2. Select the BISS mode.

The meaning of the various modes is as follows:

Mode	Meaning
BISS-0 (Scrambling Off)	Scrambling is off.
BISS-1 (Session Word)	You want to scramble the transmission by using a BISS-1 session word.
BISS-E (Clear Session Word)	You want to scramble the transmission by using a clear (unencrypted) BISS-E session word. You cannot see the session word in the GUI when typing or reloading.
BISS-E (Injected ID and ESW)	You want to scramble the transmission by using two BISS-E keys, the Injected ID and the Encrypted Session Word (ESW). You cannot see the keys when typing or reloading.

## Setting Up the Conditional Access Parameters, Continued

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3. Type in the key(s) corresponding to the selected mode.

**Important:** The D9032 Encoder will not accept changes of key values in case either of the following conditions are met:

- less than 10 seconds have elapsed since last change of a key value.
- more than 10 changes in key values have been made within the last 5 minutes

This means that only one parameter can be changed per Apply.

All keys must be in hexadecimal notation and in the range from 0 to 9 and A to F.

The Session Word and Clear Session Word must to be 12 characters long. The ESW must to be 16 characters long and the Injected ID must to be 14 characters long.

**Note:** You cannot edit individual characters in the input fields. If you have to change a key you must type the whole key and click Apply.

4. Click **Apply**.

### Management Center Tool (MCT)

If you click the Download MCT Application button a small program enables you to calculate the following keys:

Input	Result
I. ID and session word for encoder	ESW for encoder
I. ID and ESW for encoder	Session Word
Injected ID for decoder	ESW or decoder

## Section J - Setting Up the PSI

### Enabling/Disabling the PSI/SI Information

---

#### To Enable or Disable the PSI/SI Information

Proceed as follows to enable or disable the PSI/SI information:

1. From the user interface of the D9032 Encoder click the **PSI** tab.



2. To enable the PSI/SI information, check the enable PSI/SI information check box.
3. Click **Apply**.

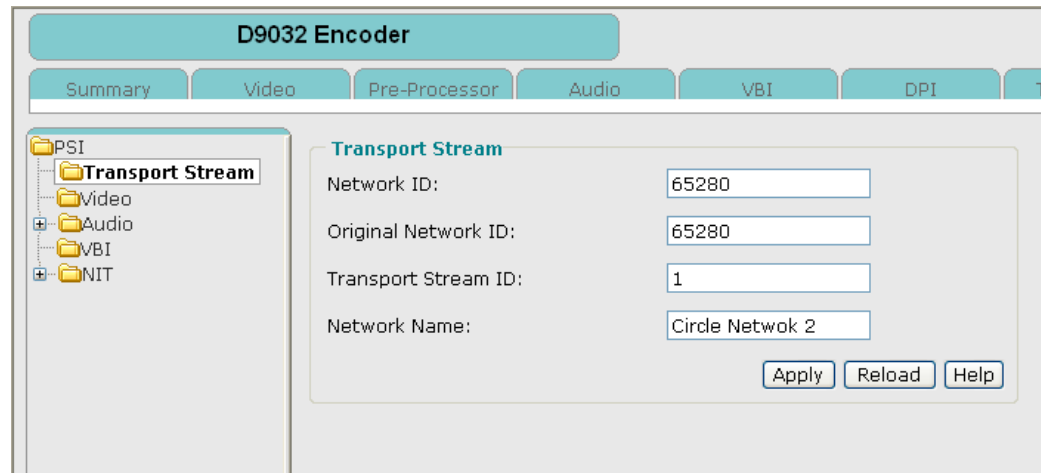
# Setting Up the Transport Stream

---

## To Set Up the Transport Stream

Proceed as follows to set up the Transport Stream:

1. From the user interface of the D9032 Encoder click the **PSI** tab and the **Transport Stream** icon from the sub-pages.



The screenshot shows the 'D9032 Encoder' user interface. At the top, there is a teal header bar with the title 'D9032 Encoder'. Below this is a horizontal tab bar with several tabs: 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', 'DPI', and 'T'. The 'PSI' tab is selected, and within it, the 'Transport Stream' sub-tab is active. On the left side, there is a tree view showing the hierarchy: 'PSI' (expanded) contains 'Transport Stream' (selected), 'Video', 'Audio', 'VBI', and 'NIT'. The main area on the right is titled 'Transport Stream' and contains four input fields: 'Network ID:' with the value '65280', 'Original Network ID:' with the value '65280', 'Transport Stream ID:' with the value '1', and 'Network Name:' with the value 'Circle Network 2'. At the bottom right of this section are three buttons: 'Apply', 'Reload', and 'Help'.

2. Type the network ID. The range is from 0 to 65535.
3. Type the original network ID.  
**Note:** If the NIT is transmitted on the network on which the TS was originated, the network ID and the original network ID have to be identical.
4. If required, change the TS ID of the transport stream.  
You may type a figure between 1 and 65535. You may type the ID as a decimal figure.
5. Type the network name.  
You may type alphanumeric characters. Up to 30 characters are allowed. The supported character set is ASCII.
6. Click **Apply**.



# Setting Up the Video Program

---

## To Set Up the Video Program

Proceed as follows to set up the Video Program:

1. From the user interface of the D9032 Encoder click the **PSI** tab and the **Video** icon from the sub-pages.

The screenshot shows the 'D9032 Encoder' user interface. At the top, there is a teal header bar with the title 'D9032 Encoder'. Below this is a row of tabs: 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', 'DPI', and 'T'. The 'Video' tab is currently selected. On the left side, there is a tree view showing the hierarchy of PSI elements: 'PSI' (expanded), 'Transport Stream', 'Video' (selected), 'Audio', 'VBI', and 'NIT'. The main area on the right is titled 'Video' and contains several input fields: 'Program Number' (value: 1), 'PMT PID' (value: 8020), 'Video PID' (value: 8000), 'Program Name' (value: TV Lowland), and 'Program Provider' (value: Lowland Productions). At the bottom right of this section are three buttons: 'Apply', 'Reload', and 'Help'.

2. Accept the suggested program number or type a new one.  
You may type a figure in the range from 1 to 65535. Observe that you may not use the same Program number for any other program.
3. Accept the suggested PMT PID or type a new one.  
You may type a figure in the range from 16 to 8190<sup>3)</sup>. Observe that you may not use the same PID for any other element.
4. Accept the suggested Video PID or type a new one.  
You may type a figure in the range from 16 to 8190<sup>4)</sup>. Observe that you may not use the same PID for any other element.
5. Type the SDT program name.  
You may type alphanumeric characters. Up to 30 characters are allowed. The supported character set is ASCII.
6. Type the name of the SDT program provider.  
You have a maximum of 30 alphanumeric characters at your disposal.
7. Click **Apply**.

3) Note that the DVB tables use the PIDs from 16 to 20.

## Defining the Audio-only Programs

### To Define the Audio Only Program

Proceed as follows to define the Audio-only Program:

1. From the user interface of the D9032 Encoder click the **PSI** tab and click the Audio icon from the sub-pages.

Program	Program #	PMT PID	Program Name	Program Provider
1	2	8021	Radio 1	Lowland Radio
2	3	8022	Radio 2	Lowland Radio
3	4	8023	Radio News	Highland Radio
4	5	8024	NoName	NoName
5	6	8025	NoName	NoName
6	7	8026	NoName	NoName
7	8	8027	NoName	NoName
8	9	8028	NoName	NoName

2. Type the program number in the Program # field.  
The program number must be unique within the transport stream and in the range from 1 and 65535. Zero disables the program in question.
3. Type the PMT PID in the PMT field  
The legal range is from 16 to 8190<sup>4)</sup>. Observe that you may not use the same PID for any other program element.
4. Type the program name in the Program Name field.  
You may type alphanumeric characters. Up to 30 characters are allowed. The supported character set is ASCII.
5. Type the name of the program provider in the Program Provider field.  
You have a maximum of 30 alphanumeric characters at your disposal.
6. Repeat steps 2 to 4 for any other programs you want to define.
7. Click **Apply**.

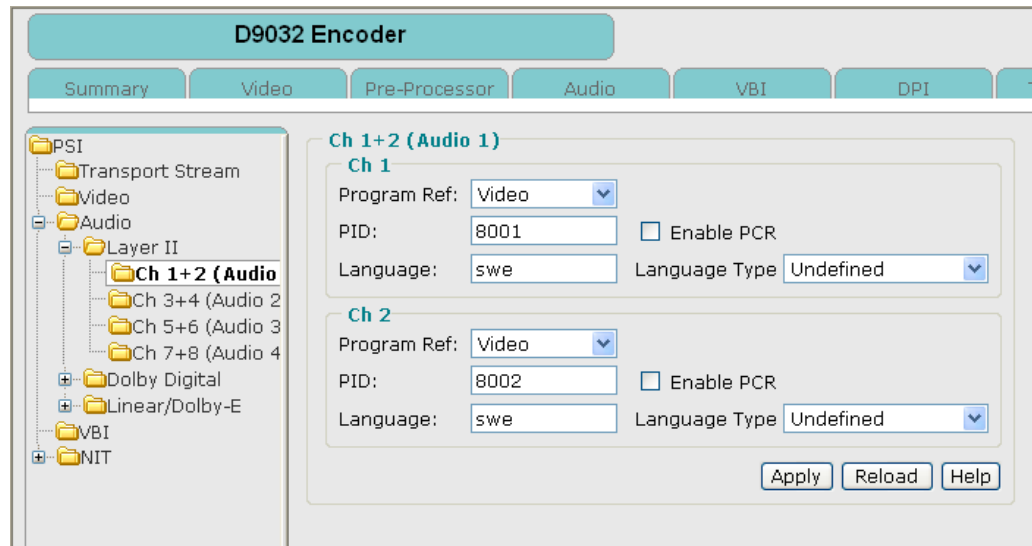
<sup>4)</sup> Note that the DVB tables use the PIDs from 16 to 20.

# Setting Up the Layer II Audio Program

## To Set Up the Layer II Audio Program

Proceed as follows to set up the Layer II Audio Program:

1. From the user interface of the D9032 Encoder click the **PSI** tab, expand the Layer II icon and click one of the channel icons from the sub-pages.



2. Select the Program Reference.

When you select **Video** the audio in question will be part of the video program. When you select one of the audios you define that audio channel to be part of the selected audio program. In this way you can set up several audio channels to be part of the same audio program. The program reference number refers to the equivalent number in the program column on the main PSI Audio page.

**Note:** Audio only is encoded by itself without any additional video encoding delay.

3. If relevant, enable the PCR.

**Important:** An audio only program consisting of one or more audio tributaries must have at least one PCR PID enabled. If the audio is attached to the Video it does not need a PCR PID.

4. Type the audio PID.

The legal range is from 16 to 8190<sup>5)</sup>. Observe that you may not use the same PID for any other program element.

5) Note that the DVB tables use the PIDs from 16 to 20.

## Setting Up the Layer II Audio Program, Continued

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5. Type the audio language.

You must type in three letters. The supported languages are according to ISO 639-2. The audio language is signalled in a PSI table and used by satellite receivers.

Refer to Appendix D for the standard codes for the representation of names of languages according to ISO 639-2.

6. Select the audio language type.

This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g. viewers who have visual impairments.

7. Click **Apply**.

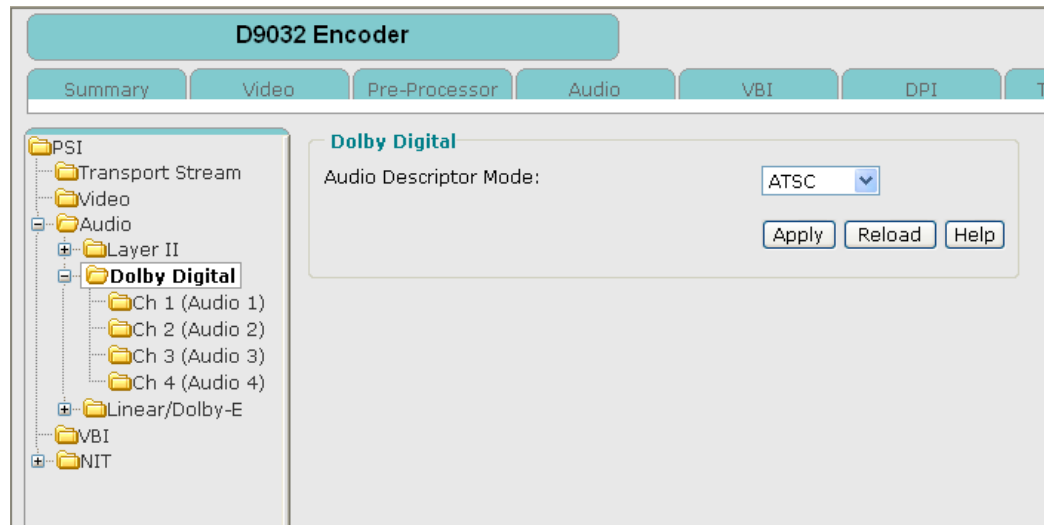
## Selecting the Dolby Digital Audio Descriptor Mode

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### To Select the Dolby Digital Audio Descriptor Mode

Proceed as follows to select the Dolby Digital Audio Descriptor Mode:

1. From the user interface of the D9032 Encoder click the **PSI** tab; expand the Audio icon and click the Dolby Digital icon from the sub-pages.



2. Select DVB or ATSC mode.

This setting determines whether it is signaled in the PMT and PAT that Dolby Digital audio is transmitted according to the DVB or the ATSC standard. The default setting is ATSC mode.

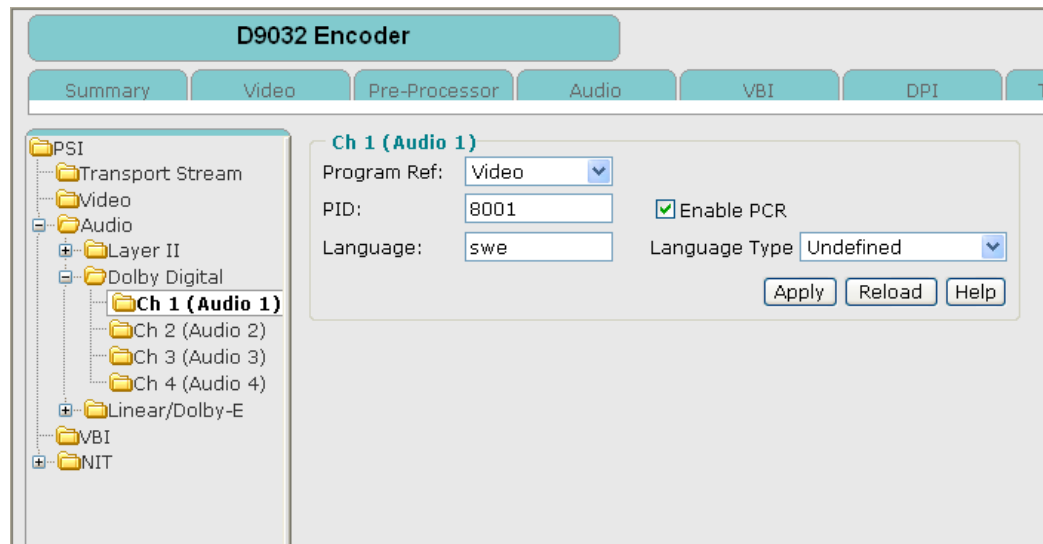
## Click Apply. **Setting Up the Dolby Digital Audio Program**

---

### To Set Up the Dolby Digital Audio Program

Proceed as follows to set up the Dolby Digital Audio Program:

1. From the user interface of the D9032 Encoder click the **PSI** tab, expand the Dolby Digital icon and click one of the channel icons from the sub-pages.



2. Select the Program Reference.

When you select **Video** the audio in question will be attached to the video.

When you select one of the other audios, you define that audio channel to be the program reference. In this manner, you can set up several audio channels to have the same program reference. The program reference number refers to the program reference number on the main PSI Audio page.

**Note:** Audio only is encoded by itself without any additional video encoding delay.

3. Type the audio PID.

The legal range is from 16 to 8190<sup>6)</sup>. Observe that you may not use the same PID for any other program element.

4. If relevant, enable the PCR.

**Note:** An audio only program consisting of one or more audio tributaries must have at least one PCR PID enabled. If the audio is attached to the Video, it does not need a PCR PID.

6) Note that the DVB tables use the PIDs from 16 to 20.

## Setting Up the Dolby Digital Audio Program, Continued

---

5. Type the audio language.

You must type in three letters. The supported languages are according to ISO 639-2. The audio language is signalled in a PSI table and used by satellite receivers.

Refer to Appendix D for the standard codes for the representation of names of languages according to ISO 639-2.

6. Select the audio language type.

This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g. viewers who have visual impairments.

7. Click **Apply**.

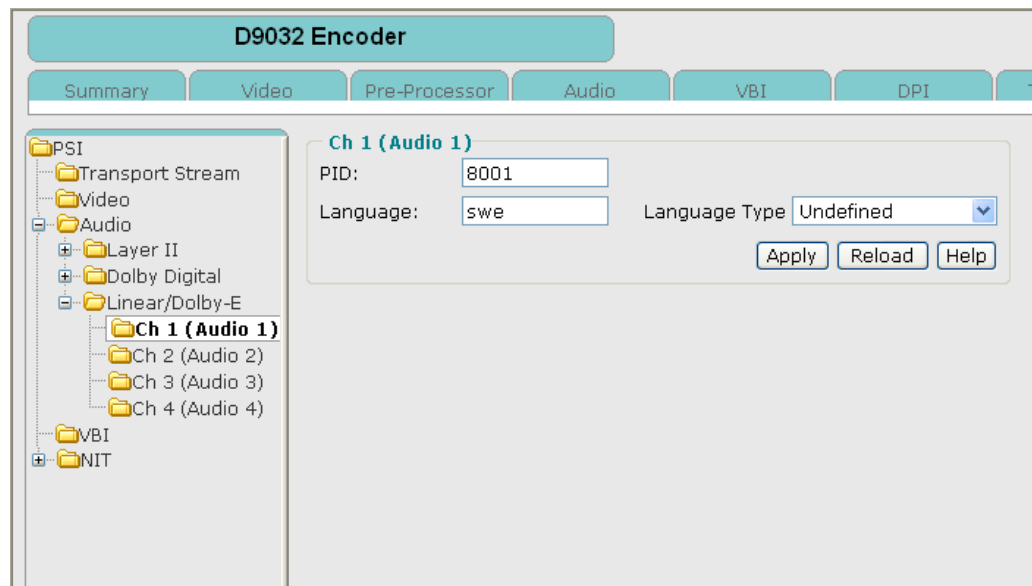
# Setting Up the Linear Audio Program

---

## To Set Up the Linear Audio Program

Proceed as follows to set up the Linear Audio Program:

1. From the user interface of the D9032 Encoder click the **PSI** tab, expand the Linear icon and click one of the channel icons from the sub-pages.



2. Type the audio PID.

The legal range is from 16 to 8190<sup>7)</sup>. Observe that you may not use the same PID for any other program element.

<sup>7)</sup> Note that the DVB tables use the PIDs from 16 to 20.



## Setting Up the Linear Audio Program, Continued

---

3. Type the audio language.

You must type in three letters. The supported languages are according to ISO-639-2. The audio language is signalled in a PSI table and used by satellite receivers. Refer to Appendix D for the standard codes for the representation of names of languages according to ISO 639-2.

4. Select the audio language type.

This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g. viewers who have visual impairments.

5. Click **Apply**.

# Setting Up the VBI PIDs and the Teletext Descriptor Table

## To Set Up the VBI PIDs and the Teletext Descriptor Table

Proceed as follows to set up the VBI PIDs and the teletext descriptor table:

1. From the user interface of the D9032 Encoder click the **PSI** tab and the **VBI** icon from the sub-pages.

Index	Enable	Language	Type	Magazine	Descriptor Page
1	<input type="checkbox"/>	eng	Initial Page	1	1
2	<input type="checkbox"/>	eng	Initial Page	1	1
3	<input type="checkbox"/>	eng	Initial Page	1	1
4	<input type="checkbox"/>	eng	Initial Page	1	1
5	<input type="checkbox"/>	eng	Initial Page	1	1
6	<input type="checkbox"/>	eng	Initial Page	1	1
7	<input type="checkbox"/>	eng	Initial Page	1	1
8	<input type="checkbox"/>	eng	Initial Page	1	1
9	<input type="checkbox"/>	eng	Initial Page	1	1
10	<input type="checkbox"/>	eng	Initial Page	1	1

2. If relevant, type the EBU Teletext PID.

You may type a figure in the range from 16 to 8190<sup>8)</sup>. Observe that you may not use the same PID for any other element.

**Important:** Transmission of teletext is only applicable in 625 lines systems. Teletext may also be transmitted as DVB-VBI Teletext, see the description of the DVB-VBI PID below.

3. If relevant, type the DVB-VBI PID.

The DVB VBI may contain VPS, WSS, DVB-VBI Teletext and transparent lines encoded according to the DVB-VBI specifications. The legal range is from 16 to 8190<sup>1)</sup>. Observe that you may not use the same PID for any other program element.

8) Note that the DVB tables use the PIDs from 16 to 20.

## Setting Up the VBI PIDs and the Teletext Descriptor Table, Continued

---

4. When selecting the DVB-VBI PID, choose the DVB-VBI Teletext Descriptor Tag; either DVB or EBU.

When you select DVB, the DVB VBI descriptor is used according to DVB standards.

When you select EBU, the DVB VBI descriptor in the PMT contains a teletext PID instead of a DVB teletext descriptor when the DVB VBI PID contains teletext. This setting is used to ensure compatibility with older set top boxes.

5. If relevant, type the Proprietary Transparent lines PID.

You may type a figure in the range from 16 to 8190<sup>1)</sup>. Observe that you may not use the same PID for any other program element.

6. If relevant, set up the teletext descriptor table.

**Important:** The Teletext Descriptor settings apply to both the DVB-VBI teletext and the EBU-formatted teletext.

- Enable the relevant loop (the teletext descriptor Index).

For each program containing teletext you can enable up to 16 different loops in the teletext descriptor. Each loop describes the language, the type of teletext situated on specific magazines and pages in these magazines.

- Type the language of the teletext.

The supported languages are according to ISO-639-2. If you have an additional language within the same teletext transport stream, you have to add an additional loop with related settings.

Refer to Appendix D for the standard codes for the representation of names of languages according to ISO 639-2.

- Select the type of teletext page.

The following types of teletext pages exist:

Title	Explanation
Initial page	The first teletext page.
Subtitle	Teletext subtitle page.
Subtitle H	Teletext subtitles for hearing impaired people.
Schedule	For program schedule.
Additional	For various information.

- Type the magazine number.

You may type magazines numbered in the range from 0 to 7. On a teletext decoder in a television set magazine 1 is seen as page 100, magazine 2 as page 200 and so on. Magazine 0 denotes teletext on pages 800 and above.

## Setting Up the VBI PIDs and the Teletext Descriptor Table, Continued

---

- Type the descriptor page number.  
You must type the page number as a decimal number. Although you type the page number as a decimal number, the teletext decoder (TV) displays a hexadecimal number.

**Example:** Magazine 2 page 152 is displayed as page 298, where 0x98 corresponds to 152 decimal.

7. Click **Apply**.

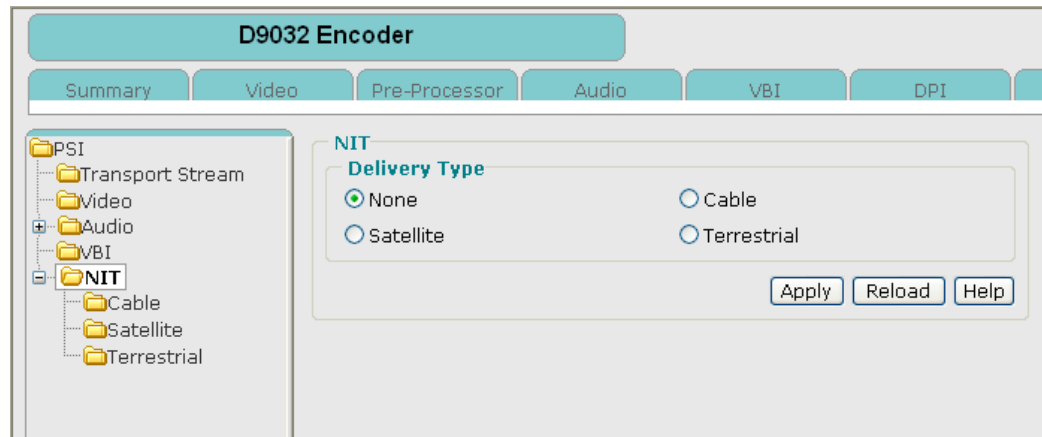
# Setting Up the NIT

---

## To Set Up the NIT

Proceed as follows to set up the NIT:

1. From the user interface of the D9032 Encoder click the **PSI** tab and the **NIT** icon in the left column. Select the relevant delivery type.



The delivery types are the:

- cable delivery system descriptor, **Setting Up the Cable NIT**, page 5-118
- satellite delivery system descriptor, **Setting Up the Satellite NIT**, page 5-119, and
- terrestrial delivery system descriptor, and **Setting Up the Terrestrial NIT**, page 5-120
- none.

The delivery system descriptors are used to transmit the physical parameters for each transport multiplex in the network. IRDs interpret the delivery system descriptor in order to tune to Transport Streams quickly. Select **None** if the transmission does not target the end user IRD.

2. Click **Apply**.

# Setting Up the Cable NIT

## To Set Up the Cable NIT

Proceed as follows to get access to the Cable NIT display:

1. From the user interface of the D9032 Encoder click the **PSI** tab, expand the **NIT** icon and click the **Cable** icon from the sub-pages.

The screenshot shows the 'D9032 Encoder' software interface. At the top, there are tabs for 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', and 'DPI'. The 'PSI' tab is selected, and within it, the 'NIT' folder is expanded, showing sub-items: 'Cable', 'Satellite', and 'Terrestrial'. The 'Cable' sub-item is selected, displaying the following parameters in a form:

Cable	
Frequency:	7,700,000 100 Hz
Symbol Rate:	68,750 100 S/s
Modulation:	64 QAM
FEC Inner:	5/6
FEC Outer:	RS 204/288

At the bottom right of the form are three buttons: 'Apply', 'Reload', and 'Help'.

## Example of Setup for a DVB Cable Delivery System

The following table shows a valid example of the NIT for a DVB cable delivery system:

Cable Delivery System Parameters	
Frequency	770 (MHz)
Symbol rate	6.875 (Msymbol/s)
Modulation	64-QAM
FEC inner	5/6 Convolutional code rate
FEC outer	RS (204/188)

# Setting Up the Satellite NIT

## To Set Up the Satellite NIT

Proceed as follows to get access to the Satellite NIT display:

1. From the user interface of the D9032 Encoder click the **PSI** tab, expand the **NIT** icon and click the **Satellite** icon from the sub-pages.

The screenshot shows the 'D9032 Encoder' software interface. At the top, there are tabs for 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', and 'DPI'. The 'PSI' tab is selected, and within it, the 'NIT' icon is expanded, showing sub-options: 'Cable', 'Satellite', and 'Terrestrial'. The 'Satellite' sub-option is selected. The main area displays the 'Satellite' configuration parameters:

- Frequency: 126,600 (10 kHz)
- Symbol Rate: 275,000 (100 S/s)
- Orbital Position: 182 (0.1 °)
- East West Flag: East (dropdown menu)
- Polarisation: Linear Horizontal (dropdown menu)
- Modulation: QPSK (dropdown menu)
- FEC Inner: 3/4 (dropdown menu)

At the bottom right of the configuration area are three buttons: 'Apply', 'Reload', and 'Help'.

## Example of Setup for a DVB Satellite Delivery System

The following table shows a typical example of the NIT for a DVB satellite delivery system:

Satellite Delivery System Parameters	
Frequency	12.266 (GHz)
Symbol rate	27.5 (Msymbol/s)
Orbital position	19.2 (degrees)
West East flag	Eastern position
Polarization	Linear - horizontal
Modulation	QPSK
FEC inner	3/4 Convolutional code rate

# Setting Up the Terrestrial NIT

## To Set Up the Terrestrial NIT

Proceed as follows to get access to the Terrestrial NIT display:

1. From the user interface of the D9032 Encoder click the **PSI** tab, expand the **NIT** icon and click the **Terrestrial** icon from the sub-pages.

The screenshot shows the 'D9032 Encoder' software interface. On the left, a tree view under the 'PSI' tab shows 'NIT' expanded, with 'Terrestrial' selected. The main area displays the 'Terrestrial' configuration page with the following settings:

Parameter	Value	Unit
Frequency	58,600,000	10 Hz
Bandwidth	8	MHz
Constellation	64 QAM	
Hierarchy	Non Hierarchical	
Code Rate HP	1/2	
Code Rate LP	2/3	
Guard Interval	1/32	
Transmission Mode	8K	
Other Frequencies	Yes	

Buttons at the bottom right: Apply, Reload, Help.

## Example of Setup for a DVB Terrestrial Delivery System

The table shows a valid example of the NIT for a DVB terrestrial delivery system:

Terrestrial Delivery System Parameters	
Frequency	586 (MHz)
Bandwidth	8 MHz
Constellation	64-QAM
Hierarchy	Non hierarchical
Code rate HP (Applies to hierarchical and non- hierarchical encoding)	rateHalf
Code rate LP (Applies to hierarchical encoding)	rateTwoThirds
Guard interval	1/32
Transmission mode	8k Mode
Other frequencies (in use)	Yes



## Section K - Working with the System

### Reading the System Information or Managing the System

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#### To Read the System Information or to Manage the System

Proceed as follows to read the system information or to manage the System:

1. From the user interface of the D9032 Encoder click the **System** tab and the **System** icon from the sub-pages.

The screenshot shows the D9032 Encoder GUI. The top navigation bar has tabs for Summary, Video, Pre-Processor, Audio, VBI, DPI, TS Output, PSI, and System. The System tab is selected. On the left, a tree view shows the System icon selected. The main content area displays the following system information:

Field	Value
System Name	D9032 Encoder
Serial Number	3105874282
Software Version	V02.10.08
Operation Hours	4925
Boot Code Version	V02.00.03
CLEI Code	URN:CLEI:MM375123XX
Date of Manufacturing	2006/11/27 21:07:00
CLLI Code	

Below the system information is the 'System Action' section, which includes buttons for Default, Reset, Lock Front Panel, Transfer Settings File (To Device, From Device), and Upgrade System (Upgrade). At the bottom right are Apply, Reload, and Help buttons.

The GUI automatically displays the serial number, software version, operating hours, the version of the boot code and the device driver/GUI version of the D9032 Encoder, the CLEI (Common Language Equipment Identifier) code and the date the encoder was manufactured. The CLEI code is unique for each encoder hardware configuration.

**Important:** Have the above information readily available if you contact a Scientific Atlanta office for support.

2. Type in the System Name.  
This field can be up to 30 characters in length and can consist of any printable character. The system name is displayed in the top left corner of the GUI.

## Reading the System Information or Managing the System, Continued

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3. If relevant, lock the front panel. When the front panel is locked you can only see settings but not change them from the front panel menus.
4. If relevant, default all settings in the D9032 Encoder.

**Note:** Use the default settings if you have set up the D9032 Encoder with illegal and incompatible settings to get the encoder back in a functional state.

5. If relevant, reset (boot) the D9032 Encoder.

**Note:** You should reset the D9032 Encoder in the following cases:

- If there has been a temperature alarm causing the encoder to disable functionality.
- If you have set or changed the IP address of the D9032 Encoder.

6. Click **Transfer Settings File To Device** if you want to update your D9032 Encoder with new settings.

You browse to the location of the settings file and click **Transfer**.

**Important:** Due to a restriction in the MS Internet Explorer the path of the settings file should be less than 50 characters long.

7. Click **Transfer Settings File From Device** if you want to create a settings file. You can save the settings file on your hard disk or on a network where other D9032 Encoders can import the settings file.

**Important:** You must give the file name the extension “.ini” in order to be able to see it when you want to **Transfer Settings File From Device**.

**Note:** The settings file is a plain ASCII file which can be edited in a ASCII editor like notepad.

8. If relevant, upgrade the software of your D9032 Encoder.

**Important:** It is recommended that you store the old setting files before upgrading to a new software version. This enables you to restore your settings if you need to downgrade.

**Note:** It may take several minutes to upgrade the software for all 4 modules. If possible keep an eye on the front panel, and make sure NOT to power cycle the encoder when the front panel reads that a upgrading process is taking place.

**Important:** Due to a restriction in the MS Internet Explorer the path of the software package file (appl.pkg) should be less than 50 characters long.

9. If relevant, enter the CLLI (Common Language Location Identifier) Code. This is normally an 11-character alphanumeric code used to identify the location of the encoder within a network.

10. If relevant lock the front panel by checking the box.

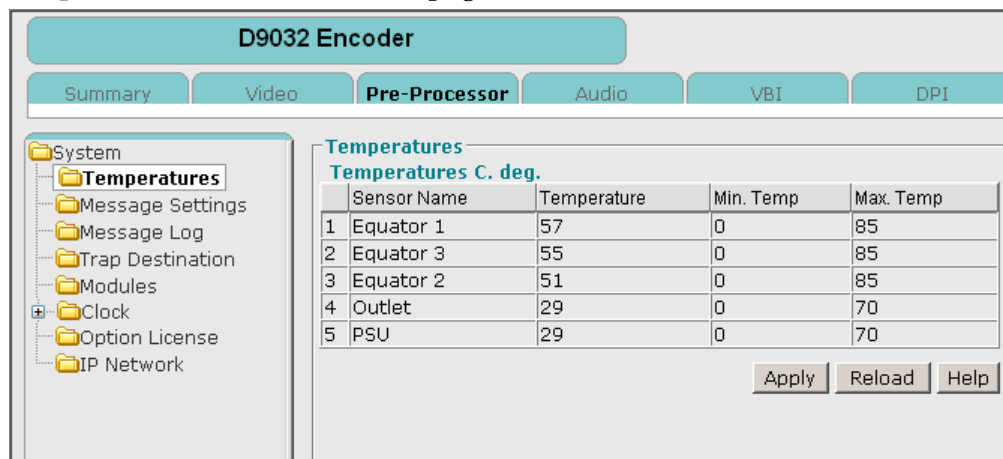
11. Click **Apply**.

# Reading the Encoder Temperatures

## To Read the Encoder Temperatures

Proceed as follows to read the encoder temperatures:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Temperatures** icon from the sub-pages.



The GUI automatically displays the temperatures measured by five sensors in the D9032 Encoder. The temperatures signify the following:

Heading	Meaning
Temperature	The measured temperature.
Min. Temp.	The lower operational limit.
Max Temp.	The upper operational limit.

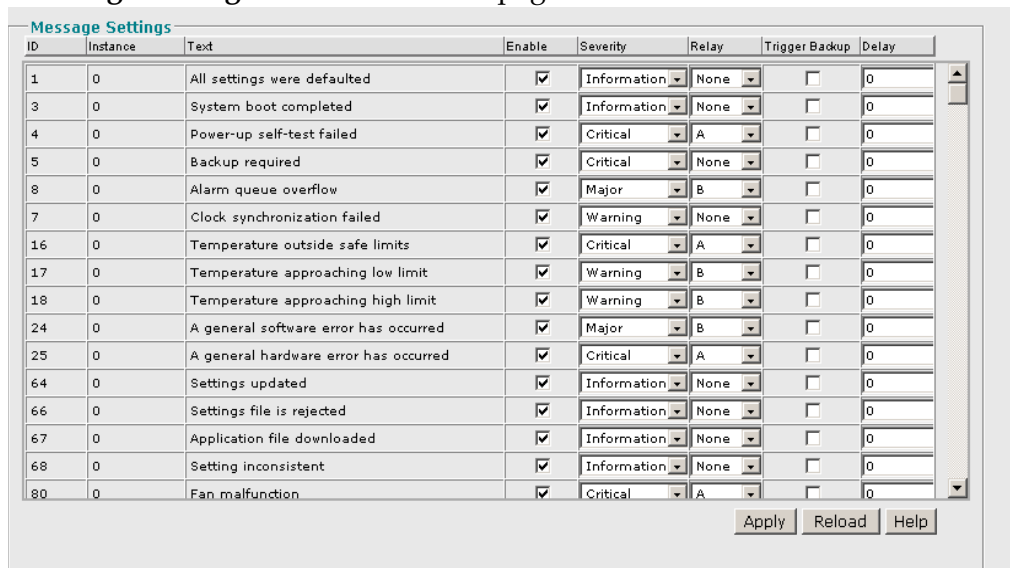
If you receive temperature alarms while the ambient temperature is within the specifications, you must check whether the air flow is blocked.

# Setting Up the Message Parameters

## To Set Up the Message Parameters

Proceed as follows to set up the message parameters:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Message Settings** icon from the sub-pages.



The screenshot shows the 'Message Settings' window. It contains a table with the following data:

ID	Instance	Text	Enable	Severity	Relay	Trigger Backup	Delay
1	0	All settings were defaulted	<input checked="" type="checkbox"/>	Information	None	<input type="checkbox"/>	0
3	0	System boot completed	<input checked="" type="checkbox"/>	Information	None	<input type="checkbox"/>	0
4	0	Power-up self-test failed	<input checked="" type="checkbox"/>	Critical	A	<input type="checkbox"/>	0
5	0	Backup required	<input checked="" type="checkbox"/>	Critical	None	<input type="checkbox"/>	0
8	0	Alarm queue overflow	<input checked="" type="checkbox"/>	Major	B	<input type="checkbox"/>	0
7	0	Clock synchronization failed	<input checked="" type="checkbox"/>	Warning	None	<input type="checkbox"/>	0
16	0	Temperature outside safe limits	<input checked="" type="checkbox"/>	Critical	A	<input type="checkbox"/>	0
17	0	Temperature approaching low limit	<input checked="" type="checkbox"/>	Warning	B	<input type="checkbox"/>	0
18	0	Temperature approaching high limit	<input checked="" type="checkbox"/>	Warning	B	<input type="checkbox"/>	0
24	0	A general software error has occurred	<input checked="" type="checkbox"/>	Major	B	<input type="checkbox"/>	0
25	0	A general hardware error has occurred	<input checked="" type="checkbox"/>	Critical	A	<input type="checkbox"/>	0
64	0	Settings updated	<input checked="" type="checkbox"/>	Information	None	<input type="checkbox"/>	0
66	0	Settings file is rejected	<input checked="" type="checkbox"/>	Information	None	<input type="checkbox"/>	0
67	0	Application file downloaded	<input checked="" type="checkbox"/>	Information	None	<input type="checkbox"/>	0
68	0	Setting inconsistent	<input checked="" type="checkbox"/>	Information	None	<input type="checkbox"/>	0
80	0	Fan malfunction	<input checked="" type="checkbox"/>	Critical	A	<input type="checkbox"/>	0

At the bottom right of the table are three buttons: 'Apply', 'Reload', and 'Help'.

The GUI displays a table of all available Messages in the D9032 Encoder system.

2. For each of the messages check Enable if you want the message to be enabled. If you enable a message it means that a message is displayed in the GUI whenever the message event occurs.

**Note:** You will not be able to see any messages in the GUI until you have set up the trap destination for the messages. For further information **Setting Up the Trap Destinations**, page 5-128.

## Setting Up the Message Parameters, Continued

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3. For each of the messages select alarm relay A, B, C or none from the relay scroll list.

**Note:** Any A-alarm will result in the alarm LED on the front panel being illuminated. Normally the A-alarm is also used for triggering a backup via the ROSA Element Manager. For information on alarm relays, see **Connecting to the Contact Closure or Cue Tone Interfaces**, page 3-16.

4. For each of the messages select a severity from the scroll list.  
The following categories are available:
  - Critical
  - Major
  - Minor
  - Warning
  - Information
5. Check **Trigger Backup** if you want the Digital Headend Backup task to be notified or the ASI and IP outputs to be turned off when the alarm event occurs. For further information refer to the *Digital Headend Backup, Task Driver for Rosa 3.0, User's Guide*, part number 6985066.
6. If required, set a message **Delay** for each event in the range from 0 to 600 seconds. In the event of the alarm, this setting delays the display or reporting of the alarm until the delay has expired.
7. Click **Apply**.

# Viewing Messages

---

## The ROSA and Web Interface

From the ROSA Control and Management System you can view messages from several units on the network. With the web interface you may have trap receiving software like the trap ringer installed. Please consult the applicable manuals for a description of software GUIs other than that of ROSA.

## Before You Begin

Before you can view any messages from the D9032 Encoder in ROSA you must set up the trap destination for the messages. For further information, see **Setting Up the Trap Destinations**, page 5-128.

## Overview

When viewing messages, you can specify which columns to show for each message and the order in which they are shown. For further information, please see the ROSA manual.

## To View the Messages in ROSA

Proceed as follows to view the messages in ROSA:

1. Right-click the D9032 Encoder icon from the COPENICUS Explorer window.
2. Select **All messages** or **Pending messages**.  
If you select pending messages, you will only see the active messages.
3. Select the message you want to investigate.

The following table shows the most important message columns:

Heading	Meaning
Msg. Info	The main message description
Name	The detailed message description
Msg. Subject	The channel in question

**Note:** Some messages from the D9032 Encoder contain additional details. If you right-click and select **Toggle Detail** from the menu you may get additional detailed information.

## Viewing the Message Log

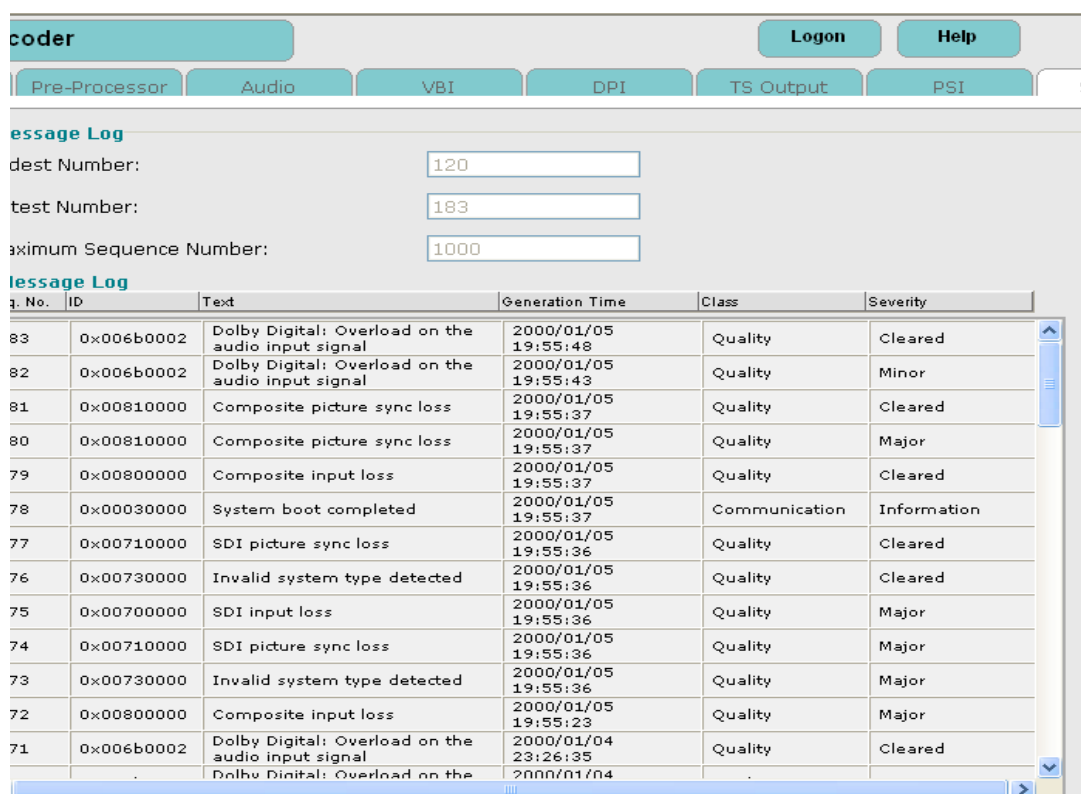
### Important

Normally, you use the ROSA message view to see any messages from the D9032 Encoder. For further information, see **Viewing Messages**, page 5-126. However, if ROSA/COPERNICUS has been shut down or there have been network errors some messages sent from the D9032 Encoder to the ROSA/COPERNICUS may be lost. In such cases you can view the messages actually stored in the D9032 Encoder by following the procedure below.

### To View the Message Log in the Web GUI

Proceed as follows to view the message log:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Message Log** icon in the left column.



Seq. No.	ID	Text	Generation Time	Class	Severity
83	0x006b0002	Dolby Digital: Overload on the audio input signal	2000/01/05 19:55:48	Quality	Cleared
82	0x006b0002	Dolby Digital: Overload on the audio input signal	2000/01/05 19:55:43	Quality	Minor
81	0x00810000	Composite picture sync loss	2000/01/05 19:55:37	Quality	Cleared
80	0x00810000	Composite picture sync loss	2000/01/05 19:55:37	Quality	Major
79	0x00800000	Composite input loss	2000/01/05 19:55:37	Quality	Cleared
78	0x00030000	System boot completed	2000/01/05 19:55:37	Communication	Information
77	0x00710000	SDI picture sync loss	2000/01/05 19:55:36	Quality	Cleared
76	0x00730000	Invalid system type detected	2000/01/05 19:55:36	Quality	Cleared
75	0x00700000	SDI input loss	2000/01/05 19:55:36	Quality	Major
74	0x00710000	SDI picture sync loss	2000/01/05 19:55:36	Quality	Major
73	0x00730000	Invalid system type detected	2000/01/05 19:55:36	Quality	Major
72	0x00800000	Composite input loss	2000/01/05 19:55:23	Quality	Major
71	0x006b0002	Dolby Digital: Overload on the audio input signal	2000/01/04 23:26:35	Quality	Cleared
		Dolby Digital: Overload on the	2000/01/04		

The Web GUI displays a table of the latest 64 messages stored in the D9032 Encoder system.

## Setting Up the Trap Destinations

---

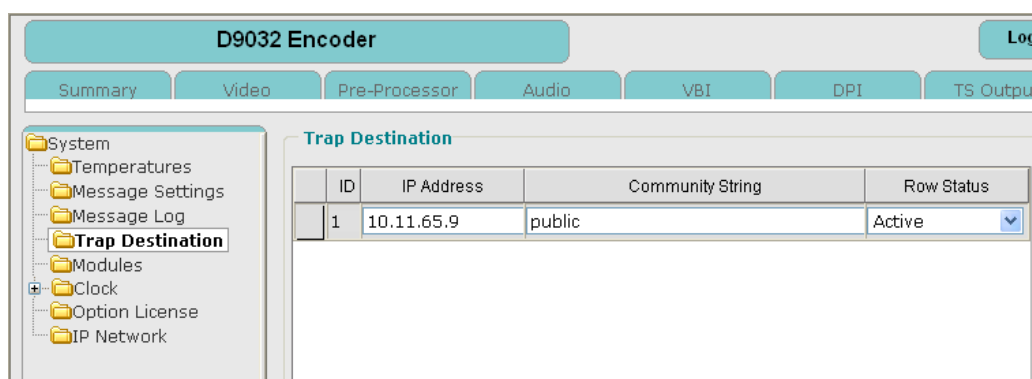
### Important

If you have a firewall between the D9032 Encoder and the COPENNICUS/Trap server you may need to change the protection settings to allow the SNMP traps from the D9032 Encoder (UDP packets) to arrive to the COPENNICUS/Trap server. To enable the D9032 Encoder Alarm/Message mechanism in ROSA/the web browser you must add a trap destination IP address to which the D9032 Encoder will start sending its SNMP traps.

### To Set Up the Trap Destination

Proceed as follows to set up the trap destination:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Trap Destination** icon from the sub-pages.



The screenshot shows the D9032 Encoder web interface. At the top, there's a header bar with the title "D9032 Encoder" and a "Log" button. Below the header, there are several tabs: Summary, Video, Pre-Processor, Audio, VBI, DPI, and TS Output. The "System" tab is selected, and a sidebar on the left shows a tree view of system components. The "Trap Destination" icon is highlighted in the sidebar. The main content area is titled "Trap Destination" and contains a table with the following data:

ID	IP Address	Community String	Row Status
1	10.11.65.9	public	Active

2. Click the Add Row button.
3. Type the IP address of the ROSA/COPENNICUS server/Trap server to receive the SNMP traps in the IP Address field.
4. Keep "public" in the Community String field.  
The Web GUI or ROSA does not evaluate the Community String field. It may be used by other systems for security handling.

**Hint:** After you have created a trap destination, you can edit the fields directly by typing in the field in question.



## Setting Up the Trap Destinations, Continued

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5. If relevant, change the Row Status for the SNMP trap

The row status indicates whether the receiving unit is active or not in service.

**Note:** The D9032 Encoder will not begin to send traps to the destination unless the row status is Active.

**Hint:** Open COPENICUS Explorer and verify that the trap destination works by right-clicking the unit you have just defined as the receiver of the traps and selecting “All Messages”. ROSA displays an informational message from the unit telling you that its settings have been updated.

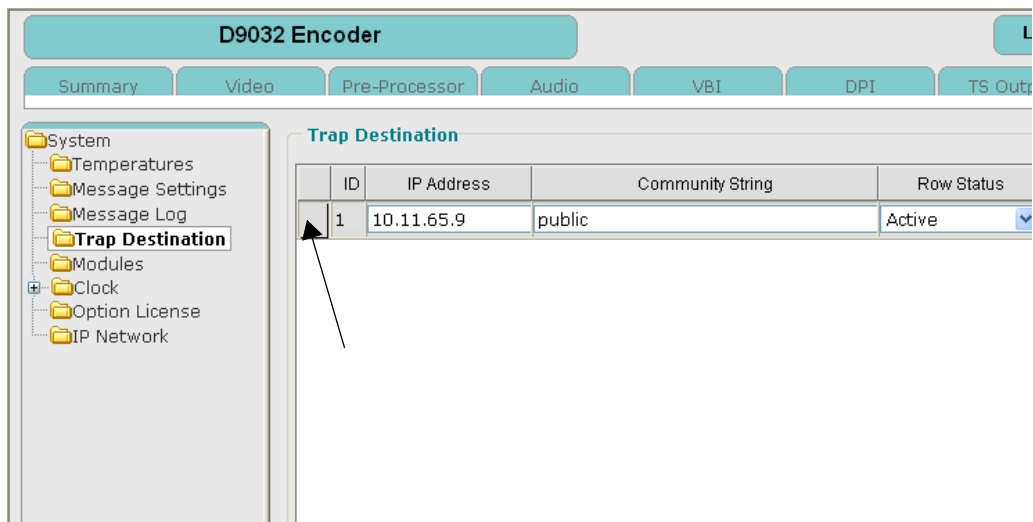
6. Repeat steps two to five for any additional SNMP trap server.
7. Click **Apply**.

# Removing a Trap Destination

## To Remove a Trap Destination

Proceed as follows to remove a trap destination:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Trap Destination** icon from the sub-pages.



2. Click in the left column outside the row you want to delete.

**Note:** To select consecutive rows, click the first column in the first row, press and hold down SHIFT, and then click the first column in the last row.

**Note:** To select rows that are not consecutive, press and hold down CTRL, and then click the first column in each row.

3. Click the Delete Row(s) button.

## Reading the Module Information

---

Proceed as follows to read the module Information:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Modules** icon from the sub-pages.

The screenshot shows the D9032 Encoder GUI. At the top, there's a teal header bar with 'D9032'. Below it are several tabs: Summary, Video, Pre-Processor, Audio, VBI, and DPI. The 'Summary' tab is selected. On the left, there's a tree view with folders: System, Temperatures, Message Settings, Message Log, Trap Destination, Modules (highlighted), Clock, Option License, and IP Network. The main area on the right is titled 'Modules'. It contains three input fields: 'System Configuration Number:' with value '4009743\_\_A\_', 'Main Board Part Number:' with value '4009743\_\_A\_-451.111', and 'Software Part Number:' with value '000007006051'. Below these is a 'Module List' table with columns: Slot #, Description, HW Part Number, and SW Part Number. The table has one row: Slot # 2, Description 'Adv. Video Inputs', HW Part Number '401279403', and SW Part Number '007009630'. At the bottom right are buttons for 'Apply', 'Reload', and 'Help'.

Slot #	Description	HW Part Number	SW Part Number
2	Adv. Video Inputs	401279403	007009630

The GUI automatically displays:

- the system configuration number,
- the part number of the main board, and
- the part number of the embedded software.

The system configuration number is used for showing which modules are installed in the D9032 Encoder.

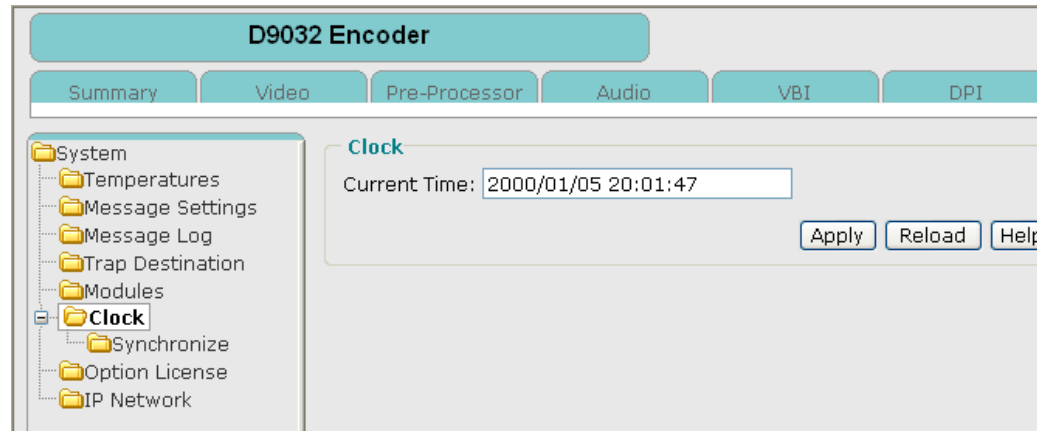
For each installed module GUI shows the module name, hardware and software part number of the module.

## Setting the Date and Time Manually

---

Proceed as follows to set the Date and Time:

1. From the user interface of the D9032 Encoder click the **System** tab and the **Clock** icon from the sub-pages.



The GUI displays the internal date and time of the D9032 Encoder.

2. Type the new date and time in the format YYYY/MM/DD HH:MM:SS in the Current Time field.  
"YYYY" designate the year, "MM" the month, "DD" the day, "HH" the hours, "MM" the minutes and "SS" the seconds. The time is the 24 hour clock.
3. Click **Apply**.

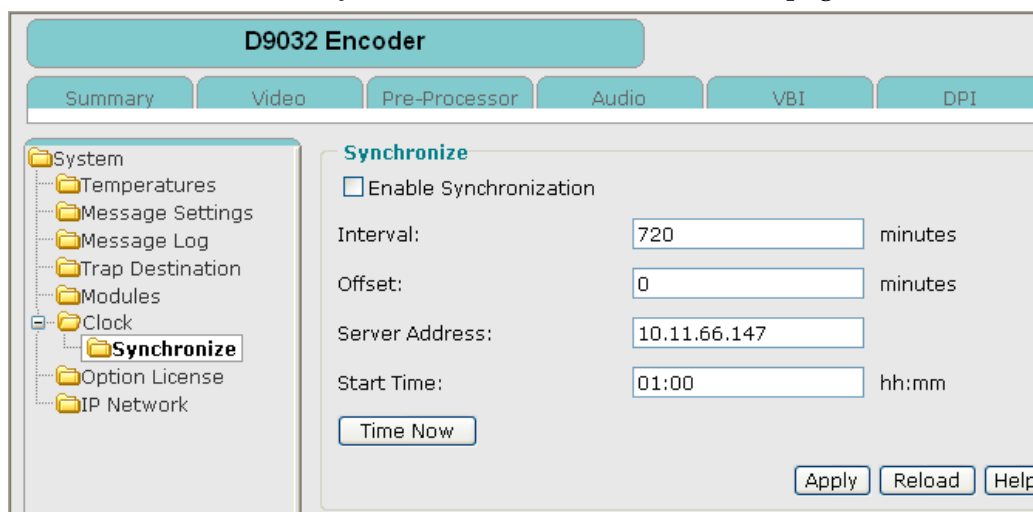
**Note:** After loss of power and after reset, the time setting is lost. If synchronization is enabled, the time is sent from the COPERNICUS/ROSA PC clock at the next synchronization.

## Setting the Clock Synchronization

---

Proceed as follows to set the Clock Synchronization:

1. From the user interface of the D9032 Encoder click the **System** tab, expand the **Clock** icon and click the **Synchronize** icon from the sub-pages.



The screenshot shows the 'D9032 Encoder' user interface. At the top, there are tabs for 'Summary', 'Video', 'Pre-Processor', 'Audio', 'VBI', and 'DPI'. The 'System' tab is selected, and a tree view on the left shows the following structure: System (expanded), Temperatures, Message Settings, Message Log, Trap Destination, Modules, Clock (expanded), Synchronize (selected), Option License, and IP Network. The main area is titled 'Synchronize' and contains the following fields and controls:

- ☐ Enable Synchronization
- Interval: 720 minutes
- Offset: 0 minutes
- Server Address: 10.11.66.147
- Start Time: 01:00 hh:mm
- Time Now button
- Apply, Reload, and Help buttons at the bottom right.

2. Enable the synchronization.

This means that the D9032 Encoder will synchronize to the clock of the COPENICUS server/ROSA PC or any other time server with the address specified in the Server Address field. Only the TCP based daytime service is implemented as defined in the RFC 867.

**Note:** To use the Time/Clock synchronization, you must run the BNDDTServ.exe file on the COPENICUS server/ROSA PC. This file is located on the ROSA CD.

3. Type the synchronization interval in minutes.

The COPENICUS/ROSA PC clock is automatically downloaded to the D9032 Encoder at the specified interval, starting when you Click **Apply**. To synchronize once a day at 1 o'clock am set the interval to 1440 min. and Start Time to 01:00.

**Note:** To maintain accurate synchronization between the COPENICUS server/ROSA PC, it is recommended that you synchronize once a day.

4. Type the synchronization offset in minutes. The range is from -1440 to 1440. This feature is used when the clock server is placed in a different time zone than the D9032 Encoder.
5. Type the IP address of the synchronization server.
6. Do one of the following:
  - Type the synchronization start time and click **Apply**, or

## Setting the Clock Synchronization, Continued

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- click **Apply** to store the entered settings and click **Time Now** if you want the synchronization to take effect right away.

**Note:** After loss of power and after reset, the time setting is lost. If synchronization is enabled, the time is sent from the COPERNICUS/ROSA PC clock at the next synchronization.

# Installing and Enabling Software Options

## To Install a Software Option

Before you can install a software option, you need to obtain a license file. Contact your local sales office for further information.

Proceed as follows to install :

1. From the user interface of the D9032 Encoder click the **System** tab and the **Option License** icon from the sub-pages.

Option License		
Host ID: 0000040~AANLART		
<a href="#">Install License File</a> <a href="#">Install...</a>		
Options		
Name	Status	Installation Status
VBI	Enable	Installed
Profile 4:2:2	Enable	Installed
Statmux	Enable	Installed
Noise Reduction	Enable	Installed
Pre-Analysis	Enable	Installed
Dolby Digital (Ch 1)	Enable	Installed
Dolby Digital (Ch 2)	Enable	Installed
Dolby Digital (Ch 3)	Enable	Installed
Dolby Digital (Ch 4)	Enable	Installed
DPI	Enable	Installed
Auto Concatenation	Enable	Installed
Adv. Video Input SDI	Enable	Installed

[Apply](#) [Reload](#) [Help](#)

The GUI automatically displays a list of available options and their status. The Host ID field uniquely identifies the D9032 Encoder you are working on. It consists of 5 leading 0s and the serial number of the D9032 Encoder.

2. Click the **Install...** button.
3. Browse for the license file for the option you want to install and click **Open**. Loading takes approximately 10 seconds. The Option is installed in your D9032 Encoder. Check that the text in the **Installation Status** column changes from **Not Installed** to **Installed** and the **Status** column from **Disabled** to **Enabled**.

**Important:** To install a license you must keep the file name “license.dat”. All other file names will not work.

## Installing and Enabling Software Options, Continued

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### To Enable or Disable a Software Option

Proceed as follows to enable or disable a software option:

1. On the **Option License** sub-page, click the **Status** column for the option you want to enable or disable.
2. Select **Enabled** or **Disabled** from the scroll list.  
The **Installation Status** field is a read only field.
3. Click **Apply**.



# Setting Up the IP Networking

## To Set Up the IP Networking

Proceed as follows to get access to the IP Networking:

1. From the user interface of the D9032 Encoder click the **System** tab, and click the **IP Networking** icon from the sub-pages.

Connector Name	IP Address	Subnet Mask	Default Gateway
Management	192.168.0.200	255.255.255.0	192.168.0.254
Auxiliary	150.158.230.251	255.255.255.0	0.0.0.0
TS Out	150.158.230.252	255.255.255.0	0.0.0.0

Management Port:

**IPsec**  
IP Address:   
Pre-shared Key:

2. Set the IP Address, Subnet mask and Default Gateway of the Management connector.  
This is the IP address of the D9032 Encoder.
3. Set the IP Address, Subnet mask and Default Gateway of the Aux connector.  
This connector is used for IP streaming to the backup receiver **or** for PCR synchronization.
4. Set the IP Address, Subnet mask and Default Gateway of the TS Out connector.  
This connector is used for IP streaming to the main receiver.
5. Select the **Management** port, either Management or TS Out. Selecting **Both** enables management on both ports.

**Note:** If the Management port is set to Both and IPsec is enabled, IPsec will only be enabled on the TS Out port (i.e., there will be no security on the Management port).

**Note:** Note: If the ports must be on the same subnet, select either TS Out or Management, but not Both. If the two ports are on the same subnet, the encoder will not function properly.

**Note:** If you change the management port, you must reset the encoder either via the Web GUI or front panel LCD to affect the change. A warning message will be displayed advising you to reset the encoder.

## Setting Up the IP Networking, continued

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6. Management Traffic can be secured via **IPsec**. IPsec parameters consist of a Destination IP Address and the Pre-shared Key which contains a password for the secure connection. They can both be set in the Web GUI or on front panel. When IPsec is enabled by setting a destination address and a pre-shared key (for encryption), you won't be able to communicate with the device until you have established a secure connection between the encoder and the destination network/devices. It is possible to enable IPsec in both Linux and Windows for secure connection to devices.

**Note:** It is necessary to re-establish the secure connection to the D9022 Encoder if it is reset/rebooted.

7. Click **Apply**.

8. Reset the D9032 Encoder.

This can be done from the **System** tab page. The IP addressing will not take place until the D9032 Encoder is reset.

**Note:** If you have changed the IP address of the Management port you must reconnect to the D9032 Encoder by entering the new address in the address field of the web interface.

# Chapter 6

## Service and Maintenance

### Overview

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#### Introduction

This chapter gives information to assist you in replacing the fan and fuses. It also describes how the status of the D9032 Encoder is communicated via front panel LEDs and messages.

#### In This Chapter

This chapter contains the following topics:

Topic	See Page
<b>Section A - Replacing Fans and Fuses</b>	6-2
Introduction	6-2
Replacing the Fan	6-3
Replacing the DC Fuse	6-7
Replacing an AC Fuse in the Power Supply	6-6
Replacing the DC Fuse	6-7
<b>Section B - Status Signaling</b>	6-8
Front Panel LEDs	6-8
Messages	6-9

# Section A - Replacing Fans and Fuses

## Introduction

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### General Service Information

This section provides general service guidelines. Furthermore you will find some troubleshooting information.

### Adjustment and Calibration

The D9032 Encoder does not require regular adjustments or calibrations, however, to ensure proper cooling the fan needs to be replaced every 4th year. In addition, the fan can be replaced if the installed fan is not functioning correctly.

# Replacing the Fan

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## General

To ensure proper cooling of the D9032 Encoder replace the fan every fourth year.



### **WARNING:**

**Allow only qualified service personnel to open the unit. Otherwise, personal injury or equipment damage may occur.**

## Before You Start

You need the following tools and accessory:

Item	Part Number
Screwdriver, PH-1	N/ A
Flat-bladed screwdriver	N/ A
Internal hex 5.5 mm screwdriver	N/ A
Fan kit	4008940

## To Replace the Fan

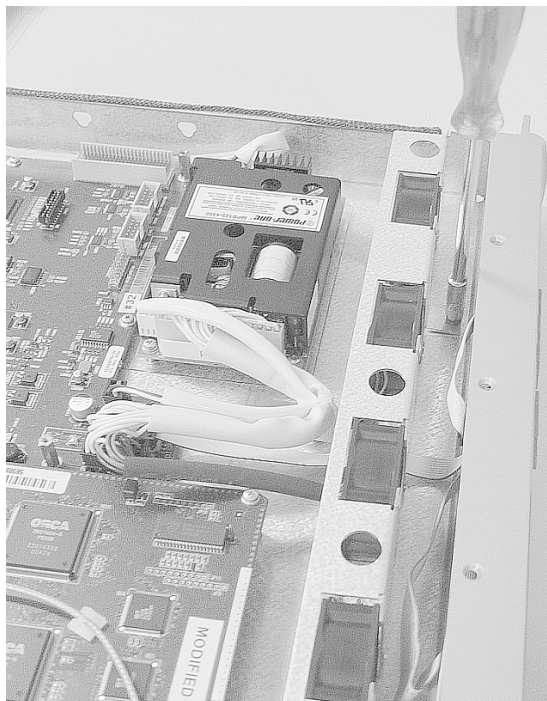
Do as follows to replace the fan:

1. Switch off the power to the D9032 Encoder; remove the power cord and dismount the D9032 Encoder from the rack.  
Pull on the connector to disconnect the cable. Never pull on the cable itself.
2. Unscrew the 8 screws holding the top plate.  
Use a PH-1 screwdriver.

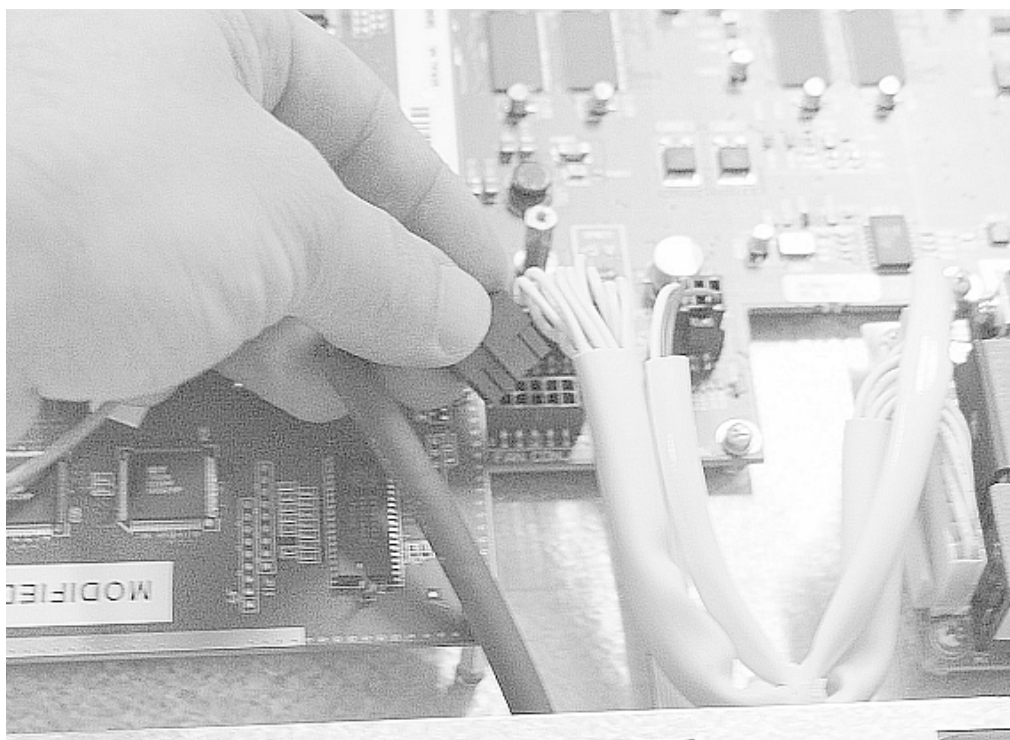
## Replacing the Fan, Continued

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3. Unscrew and remove the nuts and washers; two in front of the fan unit, and one at each side. Use an internal hex 5 mm screwdriver.



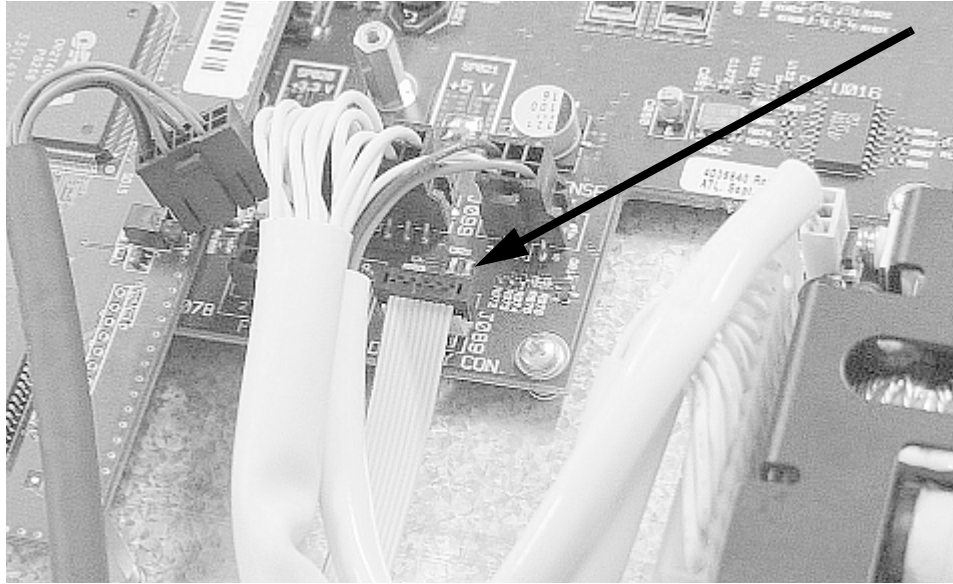
4. Unplug the fan connector at the main board.



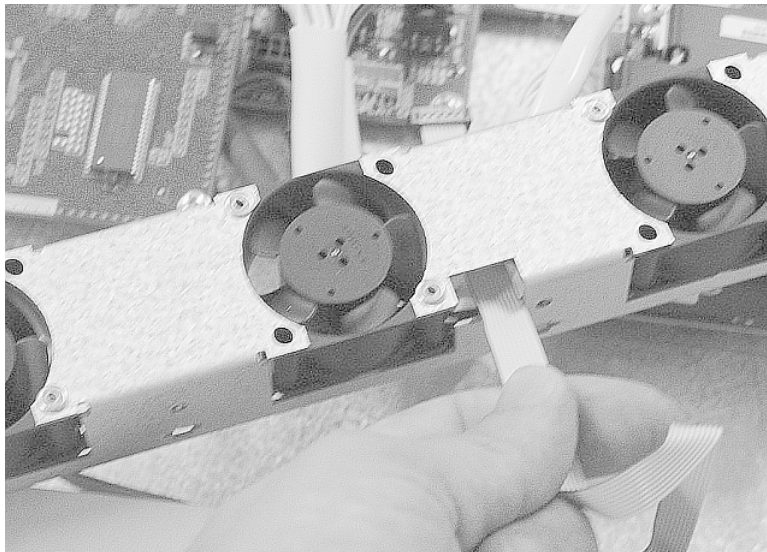
## Replacing the Fan, Continued

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5. Unplug the front panel connector from the main board.



6. Pull out the cable through the opening in the fan unit.



7. Replace the fan.
8. Mount in reverse order.

**Note:** Make sure that the cable with the front panel connector goes through the opening in the fan unit and not below it.

9. Dispose of the old fan.  
Do not dispose of the old fan through the household garbage collection system, but follow your local regulations.

# Replacing an AC Fuse in the Power Supply

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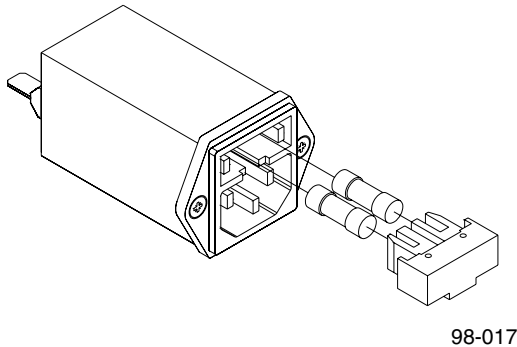
## To Replace an AC Fuse

To replace an AC fuse do the following:

1. Turn off the power to the D9032 Encoder.
2. Remove the power cord from the D9032 Encoder.
3. Open the lid holding the fuses.  
Use a flat bladed screwdriver.

**Note:** There is a fuse in both phase conductors.

4. Pull out the lid.



5. Remove the blown fuse(s).
6. Insert a new fuse with the same rating.  
The fuse rating for the D9032 Encoder is **2 AT**.



### CAUTION:

**For continued protection against risk of fire replace only with same type and rating of fuse.**

7. Reinsert the lid.



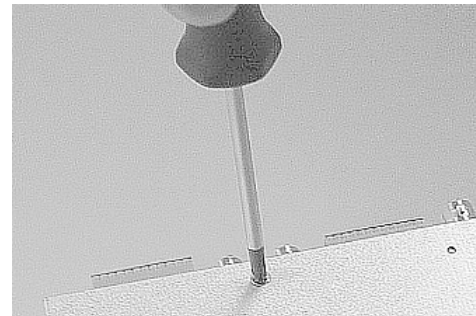
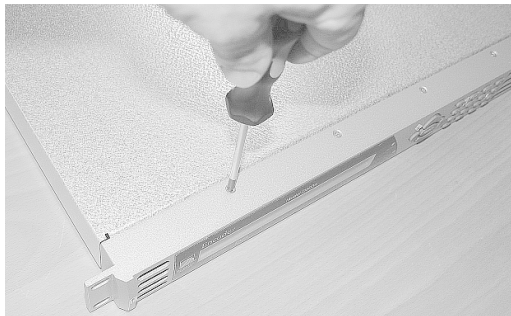
# Replacing the DC Fuse

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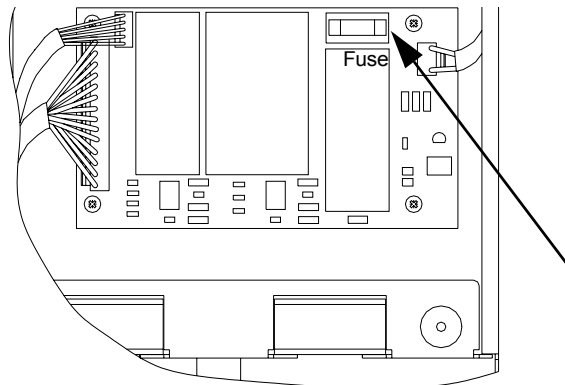
## To Replace the DC Fuse

To replace a DC fuse do the following:

1. Remove the power cable from the D9032 Encoder.  
Pull on the connector to disconnect the cable. Never pull on the cable itself.
2. Dismount the D9032 Encoder from its rack.
3. Unscrew the 8 screws holding the top plate and remove it.  
Use a flat-bladed screwdriver for the 4 screws at the front panel. Use a PH 1 screwdriver for the 4 screws at the rear.



4. Locate the fuse on the DC power supply unit.



5. Remove the cover holding the blown fuse.
6. Remove the blown fuse.
7. Insert a fuse with a 3.15 AT rating.



### CAUTION:

**For continued protection against risk of fire replace only with same type and rating of fuse.**

8. Mount in reverse order.

## Section B - Status Signaling

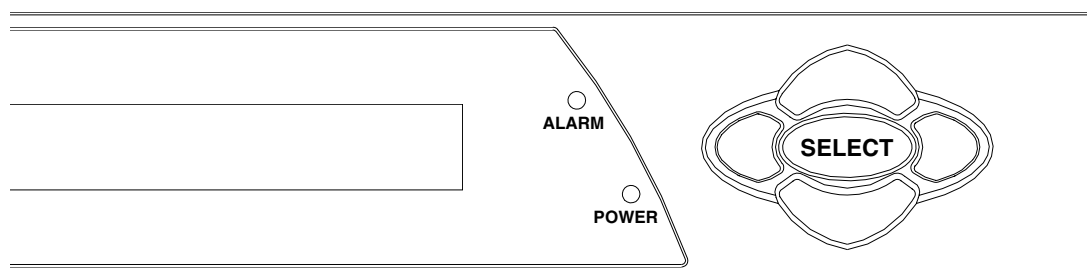
### Front Panel LEDs

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#### Overview

To help signal the status of operation or the presence of an alarm the D9032 Encoder makes use of front panel LEDs.

The drawing below shows the LEDs on the front panel of the D9032 Encoder.



#### LED Function

The function of the LEDs is described in the table below.

LED	Signal	Explanation	Remedy
POWER	Green	The D9032 Encoder is correctly powered	N/A
	Off	There is no power present.	Check the AC/DC line supply.
ALARM	Red	An A-alarm is active.	See the explanation/remedy in <b>Messages</b> , page 6-9.
	Off	No A-alarm is active.	N/A

# Messages

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## General

The status of the D9032 Encoder and its immediate surroundings is reported to ROSA in the form of messages and alarms. In ROSA you can enable or disable messages and attach an alarm category to each message.

## Before You Start

Messages from the D9032 Encoder are shown in the COPERNICUS Explorer. For information on how to view messages, see **Viewing the Message Log**, page 5-127.

You define and set up the status of the messages from the Message Settings page in the D9032 Encoder GUI. For further information on how to set up messages, see **Setting Up the Message Parameters**, page 5-124.

## D9032 Encoder Message List

The following shows an alphabetical list of the available messages, their default status and an explanation to the messages:

Message	Description and Remedy	Severity	Default alarm category	Enable
A general hardware error has occurred.	Description: A general hardware error has occurred. Remedy: When persistent, contact your Scientific Atlanta technical support center for repair.	Critical	A	On
A general software error has occurred.	Description: A general software error has occurred. Remedy: If problems are observed, reset the encoder. When persistent, contact your Scientific Atlanta technical support center for further assistance.	Major	B	On
All settings were defaulted.	Description: All settings were set to default as a result of a default command. Remedy: Not applicable.	Information	None	On
An option has expired.	Description: An installed option license expired. Remedy: Order the needed license through your local Scientific Atlanta Technical support center.	Information	None	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Application file downloaded.	Description: An application code has been downloaded to the encoder. The system will reboot. Remedy: Wait for the unit to reboot.	Information	None	On
Backup required.	Description: Backup is required. One of the events configured to trigger a backup event has occurred. Remedy: Look at the other messages to find the cause of this event.	Critical	None	On
Can't enable option as it is not installed.	Description: The installed license file doesn't contain information about the enabled license. Remedy: Order the needed license through your local Scientific Atlanta Technical support center.	Information	None	On
Clock synchronization failed.	Description: The device failed to fetch the clock from the time server. Remedy: Check the IP address for the clock server and the IP routing. Also check that the time server uses the RFC 867 (Day Time Protocol).	Warning	None	On
Composite input loss.	Description: There is no video source on the composite video input. Remedy: Examine the video input selection in the GUI and check the video source.	Major	A	On
Composite picture sync loss.	Description: The composite video signal does not comply with the specifications. Remedy: Check the input signal (frequency offset, jitter, etc.).	Major	B	On
Dolby Digital: AES/EBU audio input error.	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Major	B	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Dolby Digital: Audio delay error.	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change video settings to decrease end-to-end delay. Check relative and external delay settings.	Major	B	On
Dolby Digital: DSP Delay high error.	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Minor	None	On
Dolby Digital: DSP Delay low error.	Description: The audio delay setup on the Audio DSP is too low. Remedy: Increase the audio delay	Major	B	On
Dolby Digital: Embedded audio not locked.	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Major	B	On
Dolby Digital: Overload on the audio input signal.	Description: The audio input signal is overloaded. The audio input level is too high and close to the clipping level. Remedy: Increase the clipping level or reduce the input level.	Minor	B	On
Dolby Digital: Passthrough FRMSZCOD lower and changed.	Description: The frame size code field is lower than expected and has changed. Remedy: Lower the bit rate on the Dolby encoder.	Minor	None	On
Dolby Digital: Passthrough FRMSZCOD not valid.	Description: The frame size code field is not valid. Remedy: Use a valid bit rate on the Dolby encoder.	Major	B	On
Dolby Digital: Passthrough FSCOD does not match.	Description: Sampling frequency code field does not match. Remedy: Set the sampling frequencies on the Dolby encoder and the passthrough encoder to the same.	Major	B	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Dolby Digital: Passthrough FSCOD not valid.	Description: The sampling frequency code field is not valid. Remedy: Set the sampling frequency on the Dolby encoder to a legal value.	Major	B	On
Dolby Digital: Passthrough no sync.	Description: Passthrough input is missing. Remedy: Apply Passthrough signal.	Major	B	On
Dolby Digital: Passthrough rate low.	Description: The incoming bit rate on passthrough is lower than the setting. Remedy: Increase the selected bit rate.	Minor	None	On
Dolby Digital: Passthrough rate too high.	Description: The incoming bit rate on passthrough is too high. Remedy: No action needed.	Major	B	On
Dolby Digital: PCR Rate error.	Description: The requested PCR rate can non be achieved. Remedy: No action possible.	Minor	None	On
Dolby Digital: TS rate/audio rate mismatch.	Description: The encoding rate is too high compared to the TS rate, or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the audio encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact your Scientific Atlanta technical support center.	Major	B	On
DPI Cancel triggered without associated Start.	Description: An external control signal occurred out of sequence. A Start command must be triggered before it can be canceled. Remedy: Setup of automation system may need to be corrected.	Minor	None	On
DPI Message trigger ignored due to debounce delay.	Description: The general purpose input detected multiple triggers too close together in time. Remedy: Reduce the debounce delay setting, or increase the time between triggers or provide debounce protection to the general purpose input.	Minor	None	On

Message	Description and Remedy	Severity	Default alarm category	Enable
DPI PTS delay invalid.	Description: The relative delay setting has made the splice_time() PTS value to reference a point in time that has already occurred. Remedy: Change relative delay parameters.	Major	None	On
DPI Stop triggered without associated Start.	Description: An external control signal occurred out of sequence. A Start command must be triggered before it can be stopped. Remedy: Setup of automation system may need to be corrected.	Minor	None	On
DPI Transport packet overflow.	Description: Data were lost when attempting to load a DPI message to the buffer. Remedy: Increase the DPI bit rate.	Major	None	On
EDH error: EDH flag activated in encoder.	Description: The EDH (Error Detected Here) flag was activated in the encoder for one of the three groups (ANC/AP/FF). Remedy: Check your SDI source and the equipment that generates EDH.	Minor	None	Off
EDH input loss.	Description: The EDH signal has disappeared. The encoder receives no EDH data. Remedy: Check your SDI source and the equipment that generates EDH.	Major	None	Off
Encoding processing error.	Description: The internal MPEG processing of the encoder failed. The encoding will restart. Remedy: Check your settings for parameter violations. Observe the limitations in the manual. If persistent, contact your Scientific Atlanta technical support center for further assistance.	Major	B	On
Fan malfunction.	Description: The system has detected a fan malfunction. Remedy: Replace the fan if it is not working correctly.	Critical	A	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Front panel unlocked.	Description: Settings in the device can now be changed via the front panel. Remedy: Not applicable.	Warning	None	On
Invalid system type detected.	Description: The detected system type does not comply with the system type setting in the encoder. Remedy: Apply a correct system type (525 or 625 lines) or change the Video Input Type in the encoder.	Major	A	On
IP streaming buffer full.	Description: Internal buffer for IP streaming has been overwritten. TS packets have been lost and picture quality is degraded. Remedy: Lower the ASI output bit rate or check that the video IP network is not overloaded.	Major	B	On
Layer II: AES/EBU audio input error.	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Major	B	On
Layer II: Audio delay error.	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change video settings to decrease end-to-end delay. Check relative and external delay settings.	Major	B	On
Layer II: DSP Delay high error	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Minor	None	On
Layer II: DSP Delay low error.	Description: The audio delay setup on the Audio DSP is too low. Remedy: Increase the audio delay.	Major	B	On
Layer II: Embedded audio not locked.	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Major	B	On



Message	Description and Remedy	Severity	Default alarm category	Enable
Layer II: Overload on the audio input signal.	Description: The audio input signal is overloaded. The audio input level has reached the clipping level. Remedy: Increase the clipping level or reduce the input level.	Minor	B	On
Layer II: PCR rate error.	Description: The requested PCR rate cannot be achieved. Remedy: No action possible.	Minor	None	On
Layer II: TS rate/ audio rate mismatch.	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the audio encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact your Scientific Atlanta technical support center.	Major	B	On
Linear/Dolby E: AES/EBU audio input error	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Major	B	On
Linear/Dolby E: Audio delay error	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change video settings to decrease end-to-end delay. Check relative and external delay settings.	Major	B	On
Linear/Dolby E: Delay high error	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Major	A	On
Linear/Dolby E: Delay low error	Description: The audio delay setup on the Audio DSP is too low. Remedy: Increase the audio delay.	Minor	B	On
Linear/Dolby E: Embedded audio not locked	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Major	B	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Linear/Dolby E: Overload on the audio input signal	Description: The audio input signal is overloaded. The audio input level is too high and close to the clipping level. Remedy: Increase the clipping level or reduce the input level.	Minor	B	On
Linear/Dolby E: Passthrough Data invalid	Description: Passthrough data corrupted missing. Remedy: Passthrough check passthrough input.	Major	A	On
Linear/Dolby E: Passthrough No sync	Description: Passthrough input is missing. Remedy: Apply Passthrough signal.	Major	A	On
Linear/Dolby E: Passthrough rate low	Description: The incoming Data Rate on passthrough is lower than the setting. Remedy: No action needed.	Minor	B	On
Linear/Dolby E: Passthrough rate too high	Description: The incoming Data Rate on passthrough is too high. Remedy: Increase the selected bit rate.	Major	A	On
Linear/Dolby E: PCR rate error	Description: The requested PCR rate can not be achieved. Remedy: No action possible.	Minor	B	On
Linear/Dolby E: TS rate/audio rate mismatch	Description: The encoding rate is too high compared to the TS rate, or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the audio encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact your Scientific Atlanta technical support center.	Major	B	On
Power supply failure.	Description: Power supply defective or external power line is broken. Remedy: Check power cable. If persistent, contact your Scientific Atlanta technical support center for repair.	Major	B	On
Power-up self-test failed.	Description: The internal power-up self-test failed. Remedy: When persistent, contact your Scientific Atlanta technical support center for further assistance.	Critical	A	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Regulus connection error.	Description: Error detected on the RS-232 connection to the Regulus Statistical Multiplex Controller. Remedy: Check the RS-232 connection between the Statistical Multiplex Controller and the encoder. Consult the manuals for information on how to interconnect the devices.	Major	B	On
SDI input loss.	Description: There is no video source on the SDI video input. Remedy: Examine the video input selection in the GUI and check the video source.	Major	A	On
SDI picture sync loss.	Description: SDI picture sync loss. The video signal does not comply with the specifications. Remedy: Examine the video signal. It may be off-frequency or the signal is perhaps a composite signal.	Major	B	On
Settings file is rejected.	Description: No settings changed in the device as the settings file contains conflicting settings. Remedy: Not applicable.	Information	None	On
Settings updated.	Description: The settings have changed either by a settings file import or by a change via ROSA/SNMP. Remedy: Not applicable.	Information	None	On
Statmux interface RS-232 error.	Description: An error in the RS-232 statmux interface has been detected. Remedy: Check that the RS-232 cabling is OK and that the equipment connected to the RS-232 interface operates as required.	Major	B	On
Subcarrier unlock.	Description: The input is not able to lock to the subcarrier. Remedy: The frequency offset is likely too high. Color reproduction may suffer. Check your video source.	Major	B	On

Message	Description and Remedy	Severity	Default alarm category	Enable
Sync unstable.	Description: The composite video synchronization signal is unstable. Remedy: Check the video source or use a frame synchronizer.	Major	B	On
System boot completed.	Description: System boot has been completed. Remedy: Not applicable.	Information	None	On
Teletext input loss.	Description: The teletext signal has disappeared from the input. Remedy: Check your video source and the equipment that generates teletext.	Major	None	Off
Temperature approaching high limit.	Description: The temperature is approaching the upper limit for safe operation. Remedy: Check that the Fan malfunction message is enabled and not active. Apply external cooling if the ambient temperature is above 45 degrees Celsius.	Warning	B	On
Temperature approaching low limit.	Description: The temperature is approaching the lower limit for safe operation. Remedy: Raise the ambient temperature to more than 0 (zero) degrees Celsius.	Warning	B	On
Temperature outside safe limits.	Description: The temperature is outside the safe limits. The unit will be shut down. Remedy: Check that the Fan malfunction message is enabled and not active. Check that the ambient temperature is within 0 - 45 degrees Celsius.	Critical	A	On
The option import string is invalid.	Description: An option license file is invalid. Remedy: Check the Host ID and the ordered options in the option license file.	Information	None	On

Message	Description and Remedy	Severity	Default alarm category	Enable
TS rate/Video rate mismatch.	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the encoding rate or increase the TS rate. In a statmux set-up, the TS rate of an encoder must have room for the maximum instantaneous encoding rate. If a FIFO error occurs recurrently, contact your Scientific Atlanta technical support center.	Major	B	On
VII error.	Description: The encoder has detected an error in the VII signal. Remedy: Check your SDI source and the equipment that generates VII.	Major	None	Off
VITC input loss.	Description: The VITC signal in the video input signal has disappeared. Remedy: Check your video source and the equipment that generates VITC.	Major	None	Off
VPS input loss.	Description: The VPS signal in the video input signal has disappeared. Remedy: Check your video source and the equipment that generates VPS.	Major	None	Off
WSS input loss.	Description: The WSS signal in the video input signal has disappeared. Remedy: Check your video source and the equipment that generates WSS.	Major	None	Off
Ethernet link down	Description: A needed AUX or IP TS OUT port is down. If IP Streaming is enabled, the IP TS OUT port must be connected. If IP Streaming with backup is enabled, the AUX and IP TS OUT port must be connected. Remedy: Connect the port in question. The cable may be missing or the associated switch may not be working.	Warning	None	On
Wrong IPsec password	Description: An attempt to control the encoder in IPsec mode without the correct password was made. Remedy: use the correct IPsec password.	Information	None	On



# Chapter 7

## Customer Information

### Overview

---

#### In This Chapter

This chapter contains the following topics:

Topic	See Page
Product Support	7-2
Returning Products	7-4

# Product Support

---

## Hotlines

Scientific Atlanta provides its customers who have purchased support agreements with telephone support from anywhere in the world. If you require technical telephone assistance or product training support, or if you have any questions concerning their Scientific Atlanta product, you may contact the appropriate Customer Support Center from those listed below. Charges may apply for customers without a current support agreement.

Location	Phone Number
USA and Canada (Toll free)	888.949.4786
USA and Canada	+1.770.236.4786
United Kingdom and Europe	+44.8708.325.420
Asia	+852.2522.5059

**Note:** As our customer's needs change, so do our support options. For the most up-to-date support contacts and numbers, please check our support website:

<http://www.scientificatlanta.com/contactus/customersupport.htm>

Customers who call a Customer Support Center are asked specific questions in order to identify their needs. In this way, each call can be directed to the customer support representative most experienced with their Scientific Atlanta product. Customer Support Centers also provide the following pre- and post-sales support services for Scientific Atlanta products.

## Training Support

On and off-site training plus technical support services are available for purchase for both equipment operators and system administrators.

## Warranty and Post-Warranty Support

Warranty and post-warranty support services are available to help customers return Scientific Atlanta products for service or repair. For complete product warranty information, see the Warranty at the front of the manual.

## Customer Responsibility

When returning equipment, the customer is solely responsible for equipment packaging and transportation costs to the factory.

At the customer's request, Scientific Atlanta will make reasonable efforts to provide warranty service at the customer's premises, provided that the customer pays current field service rates plus direct travel and accommodation expenses.

### In Case of Repair

If your product requires repair, perform following steps.



## Product Support, Continued

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1. Notify Scientific Atlanta of the problem immediately, providing the model number and serial number of the equipment plus details of the problem. On receipt of this information, service information and shipping instructions will be provided.
2. On receipt of instructions, return the product by prepaid freight. Refer to the section Returning Products for details.

### In Case of a Fault

If your product requires repair, perform the following steps:

1. Notify Scientific Atlanta of the problem immediately, providing the model number and serial number of the equipment plus details of the problem. On receipt of this information, service information and shipping instructions will be provided.
2. On receipt of instructions, return the product by prepaid freight. Refer to the section Returning Products for details.

# Returning Products

---

## Introduction

You must have a return material authorization (RMA) number to return a product. Contact the nearest customer service center and follow their instructions.

Returning a product to Scientific Atlanta for repair includes the following steps:

- Obtaining a RMA number
- Obtaining a customer service center shipping address
- Packing and shipping the product

## Obtaining an RMA Number and Shipping Address

You must have an RMA number to return products.

RMA numbers are valid for 60 days. If you already have a number, but it is older than 60 days, you must contact a customer service representative to revalidate the number. You can return the product after the RMA number is revalidated.

Follow these steps to obtain an RMA number and shipping address.

1. Contact a customer service representative to request a new RMA number or revalidate an existing one.

Refer to the earlier section titled **Hotlines** to find a customer service telephone number in your area.

2. Provide the following information to the customer service representative:
  - Product name, model number, part number, serial number (if applicable)
  - Quantity of products to return
  - A reason for returning the product
  - Your company name, contact, telephone number, email address, and fax number
  - Any service contract details
  - Purchase order number of repair disposition authority, if available

**Result:** The customer service representative issues the RMA number and provides the shipping address.

**Note:** If you cannot provide a purchase order number:

- A proforma invoice listing all costs incurred will be sent to you at the completion of product repair.
- Customer service must receive a purchase order number within 15 days after you receive the proforma invoice.
- Products can accrue costs through damage or misuse, or if no problem is found. Products incurring costs will not be returned to you without a valid purchase order number.

## Returning Products, Continued

---

3. Proceed to **Packing and Shipping the Product**.

### Packing and Shipping the Product

Follow these instructions to pack the product and ship it to Scientific Atlanta.

1. Are the product's original container and packing material available?
  - If **yes**, pack the product in the container using the packing material.
  - If **no**, pack the product in a sturdy, corrugated box, and cushion it with packing material.

**Important:**

- You are responsible for delivering the returned product to Scientific Atlanta safely and undamaged. Shipments damaged due to improper packaging may be refused and returned to you at your expense.
  - Do not return any power cords or accessories.
2. Write the following information on the outside of the container:
    - Your name
    - Your complete address
    - Your telephone number
    - RMA number
    - Problem description

**Note:** Absence of the RMA number may delay processing of product repair and/or result in the equipment being returned unrepaired. Include the RMA number in all correspondence.

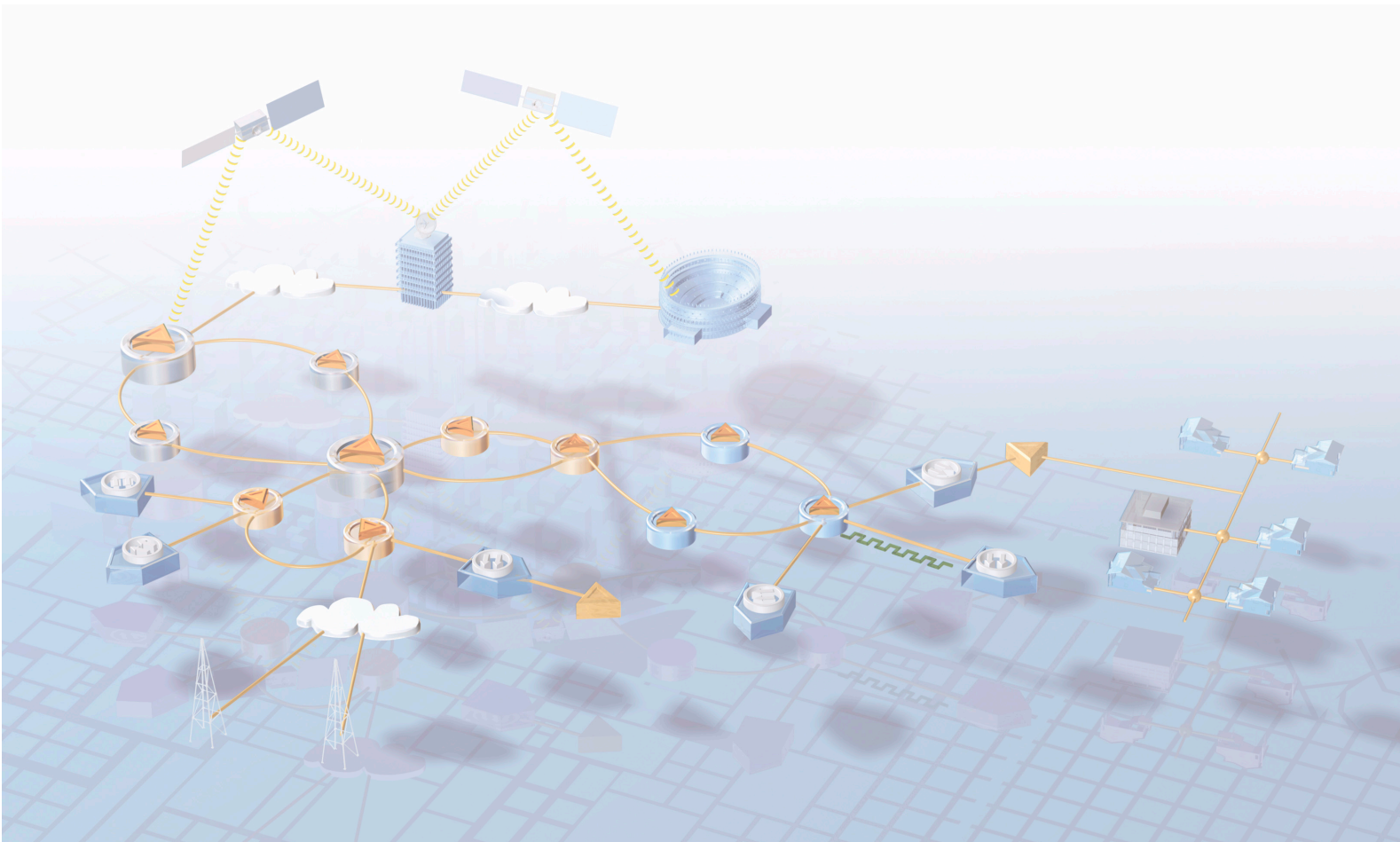
3. Ship the product to the address provided by the customer service representative.

**Note:** Scientific Atlanta does not accept freight collect. Be sure to prepay and insure all shipments.



# Appendices

- Appendix A - Technical Specifications
- Appendix B - Pre-processing
- Appendix C - Transport Stream Rates
- Appendix D - ISO 639-2 Language Codes
- Appendix E - SNMP Quick Setup Guide
- Appendix F - Equipment and Accessories
- Appendix G - References





# Appendix A

## Technical Specifications

### Overview

---

#### Introduction

This appendix contains the technical specifications for the Encoder Model D9032.

**Note:** The technical specifications are subject to change without prior notice.

#### In This Appendix

This appendix contains the following topics:

Topic	See Page
<b>Section A - Video Input and Processing</b>	A-2
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Composite Video Input	A-3
VBI Specifications in Composite Video	A-6
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<b>Section B - Audio Input and Processing</b>	A-12
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Power	A-21
General	A-22

## Section A - Video Input and Processing

### MPEG-2 Encoder Specifications

---

#### General

Item	Specification
Number of channels	1
Encoding engine	According to MPEG-2, MP@ML or 4:2:2P@ML
Frame types	I, P, and B frames
Encoding control	Adaptive coding parameters and GOP controlled by pre-analysis
PreSightPlus pre-analysis	Look-ahead for improved statistical multiplexing and normal fixed rate encoding.
PreSightPlus noise reduction	“Motion-compensated” temporal filter can be set to adaptive, fixed or none, and low-pass spatial filter can be set to adaptive, fixed or none.
Systems	525/29.97 Hz and 625/25 Hz
Modes	fixed rate, statmux
Video data bit rate	MP@ML: 0.5 to 15 Mbit/s. 4:2:2P@ML: 1.5 to 50 Mbit/s The minimum bit rate depends on picture resolution and GOP (observe the recommendations for minimum rate).
Video resolution	8 bits per sample
Chroma format	4:2:0 or 4:2:2 (option)
Aspect Ratio	4:3, 16:9 or auto-detect on VII/WSS
Line start, 625 lines encoding	23
Line start, 525 lines encoding	22 <sup>a)</sup>
H Resolutions	352, 480, 528, 544, 640, 704 and 720
V Resolutions	576 (for 625/25) and 480 (for 525/29.97)

a. If possible set the decoder to the corresponding line start.



# Composite Video Input

---

## Video Formats

Item	Specification
Composite video	PAL systems B, D, G, H, I, K, M, N <sup>a)</sup> and NTSC system M, acc. to BT 470-6

- a. The PAL M and PAL N video formats are only supported with the onboard composite module and not with the Advanced Video Input module.

## Input Characteristics

Item	Specification
Number of inputs	1
Type of connector	BNC female
Nominal internal termination, impedance	75Ω
Return loss, internal or external termination, with or without power	> 35 dB, 10 Hz to 5.5 MHz.
Nominal input level	0 dBV
Maximum non-useful DC-component	±4V

## Video Synchronization and Clamp, Onboard Composite Module

Item	Specification
Non-math video sources	No disturbances in picture with a maximum subcarrier deviation of 1 Hz
Line frequency tolerance	±30 ppm of nominal line frequency, correct sync and clamp.
Maximum input line time jitter	300 ns <sub>pp</sub>

## Video Synchronization and Clamp, Advanced Video Input Module

Item	Specification
Clamp low frequency suppression	> 20 dB at 50 Hz > 34 dB at 5 Hz
Input level range	-6 dBV to +3 dBV
Noise immunity	S/N > 20 dB, unweighted
Maximum input line time jitter	±100 ns <sub>pp</sub>

## Composite Video Input, Continued

---

### Frame Synchronizer

Item	Specification
Frame locking	To an internal nominal 27 MHz reference or an external reference via the analog REF IN connector
Tolerance of the internal reference	10 ppm
Audio wandering upon frame skip/repeat (when frame synchronizer is enabled)	$\pm 1$ frame
VBI behavior upon frame skip/repeat	Drop VBI data upon frame skip and don't insert VBI in repeated frame upon frame repeat

### Ref In

Item	Specification
Number of reference inputs	One 75 $\Omega$ , internally terminated
Type of reference	PAL/NTSC composite signal
Type of connector	BNC
Return loss	> 30 dB, 10 Hz to 5.5 MHz, with or without power
Nominal input level	0 dBV

## Composite Video Input, Continued

### Composite Video Performance

Item	Specification, Advanced Video Input Module	Specification, Onboard Composite module
Gain		
Insertion gain	$\pm 0.2$ dB	
Level stability	$\pm 0.10$ dB / 1 hour $\pm 0.15$ dB / 24 hour	
Noise		
Quantization Noise, unified weighted acc. to 567	$\leq -58$ dB RMS weighted relative to 0.7 V	$\leq -55$ dB RMS weighted relative to 0.7 V
Non-linear distortion		
Differential Gain (encoder only)	$\leq 1\%$ peak to peak	$\leq 4\%$ peak to peak
Differential Phase (encoder only)	$\leq 1^\circ$ peak to peak	$\leq 4^\circ$ peak to peak
Luminance Non Linearity	$\leq 2\%$ peak to peak	$\leq 6\%$ peak to peak
Chrominance - luminance intermodulation	$\leq 1\%$	$\leq 2\%$
Linear distortion		
Short-time waveform distortion	$K_{(p/b)} \leq 0.5\%$	$\leq 2\%$
Line-time waveform distortion	$\leq \pm 0.5\%$	$\leq \pm 1\%$
Field-time waveform distortion	$\leq \pm 1\%$	$\leq \pm 3\%$ in NTSC $\leq \pm 2\%$ in PAL
Chrominance luminance inequality		
Gain inequality	$\leq \pm 2\%$	$\leq \pm 4\%$
Delay inequality	$\pm 10$ ns	$\pm 2$ 6 ns
Steady state characteristics		
Gain/Frequency characteristics (codec)	$\leq \pm 0.2$ db; 10 Hz to 5.00 MHz $\geq -3$ dB, 6 MHz $\leq -24$ dB, 6.75 MHz $\leq -40$ dB, 8 to 27 MHz	$\leq \pm 0.65$ db; 0.5 to 5.0 MHz
Group delay response (reference at 500 kHz)	$\leq \pm 20$ ns, 10 Hz to 5.5 MHz	
Chrominance AM/PM Noise	$< -50$ dB	$< -50$ dB

## VBI Specifications in Composite Video

---

### VBI Processing

Item	Specification
Teletext B	
General	Teletext B acc. to ITU-R BT.653-3
Lines in 625 lines systems	7 to 22, 320 to 335, maximum 16 lines per field for DVB
Inverted Teletext	Applicable for EBU and DVB teletext
Output formats	According to EN 301 775 V1.1.1 (DVB-VBI Teletext) and/or according to EN 300472 V1.2.2, 1996. (EBU teletext)
Nominal input data amplitude 0 1	Black level ( $\pm 15$ mV) 462 mV ( $\pm 40$ mV)
Input data amplitude variation:	+3 dB / -6 dB
Clock run-in	10 to 16 bits
Closed Captioning with V-chip support	
General	According to EIA-608
Lines in 525 lines systems	21 field 1 and 2 (284)
Output formats	EIA 708, SA Type 4, DVS 157
VPS	
General	VPS acc. to IRT Richtlinie 8 R 6
Lines in 625 lines systems	16
Output format	According to EN 301 775 V1.1.1
WSS	
Type of signal	According to ETS 300 294 (ETSI) or Vistek Data Sheet 1649 (AFD)
Lines in 625 lines systems	First half of line 23
Output format	According to EN 301 775 V1.1.1
VITC	
General	According to ISO13818-2
Lines in 625 lines systems	6 to 22 and 319 to 335
Lines in 525 lines systems	10 to 20 and 273 to 282

## VBI Specifications in Composite Video, Continued

---

### DVB Compliant Transparent VBI

Item	Specification
Lines in 625/50	7 to 23, 319 to 335
Lines in 525/60	10 to 22 field 1 and 10 to 22 field 2 (273 to 284)
Number of lines	≤2 VBI lines per field are transferred transparently if no other DVB VBI is present. ≤1 VBI line per field is transferred transparently if any other DVB VBI is present.
Signal type	Sampled signal, 13.5 MHz Synchronization pulse and burst are regenerated in the output.
Transferred samples	All luminance samples. Chrominance samples are not transferred.
Quality	The transparent lines must have a signal quality identical to ordinary video
Dynamic range	-50 to 750 mV relative to clamp
Output format	According to EN 301 775 V1.1.1.

### Proprietary Transparent VBI

Item	Specification
Lines in 625/50	6-23, 319-335
Lines in 525/60	10 to 22 field 1 and 10 to 22 field 2 (273 to 284)
Number of lines	≤4 per field
Signal type	Sampled signal, 13.5 MHz Synchronization pulse and burst are regenerated in the output.
Transferred samples	All luminance samples. Chrominance samples are not transferred.
Quality	The transparent lines must have a signal quality identical to ordinary video
Dynamic range	-50 to 750 mV relative to clamp
Output format	Proprietary

## SDI Input

---

### System

Item	Specification
Video Formats	
Signal form	Y, CR, CB
Sampling structure	4:2:2
Line numbers/field rates	525/29.97 Hz, 625/25 Hz
Bit rate	270 Mbit/s $\pm$ 10 ppm
Video data word size	8 bit and 10 bit

### Input Characteristics

Item	Specification
Number of inputs	1
Connector	BNC connector
Nominal input level	800 mV <sub>pp</sub> nominal
Bandwidth	10 Hz to 5.75 MHz $\pm$ 0.2 dB (625/25)
Impedance	75 $\Omega$ unbalanced
Return loss	$\geq$ 15 dB in the range 5 to 270 MHz
Minimum jitter acceptance	25% of clock period, as determined over a period of one line
Interference rejection	No bit errors in presence of superimposed interfering signal
DC	$\pm$ 2.5 V <sub>pp</sub>
< 1 kHz	2.5 V <sub>pp</sub>
1 kHz to 5 MHz	100 mV <sub>pp</sub>
> 5 MHz	40 mV <sub>pp</sub>

## Embedded Data in SDI

---

### VBI Processing

Item	Specification
EDH	
General	According to SMPTE RP 165.
Alarms	Gives an error message if there is a checksum error in the EDH or no EDH on the incoming SDI signal.
Teletext B	
General	Teletext B acc. to ITU-R BT.653-3
Lines system	625 lines SDI
Lines in 625 lines systems	7 to 22, 320 to 335, maximum 16 lines per field.
Inverted Teletext	Applicable for EBU and DVB teletext
Output formats	According to EN 301 775 V1.1.1 (DVB-VBI Teletext) and/or according to EN 300472 V1.2.2, 1996. (EBU teletext)
Nominal input data amplitude 0 1	Black level ( $\pm 15$ mV) 462 mV ( $\pm 40$ mV)
Input data amplitude variation:	+3 dB / -6 dB
Clock run-in	10 to 16 bits
Closed Captioning with v-chip support	
General	According to EIA-608
Lines in 525 lines systems	Line 21 field 1 and 2 (284)
Output formats	EIA 708, SA Type 4, DVS 157
VII	
General	Acc. to SMPTE RP 186-1995 Class 1.1
Lines in 625 lines systems	Lines 11 and 324.
Lines in 525 lines systems	Line 14 field 1 and 2 (277)
Output format	Aspect ratio or AFD
VPS	
General	Acc. to IRT Richtlinie 8 R 6
Output format	According to EN 301 775 V1.1.1

## Embedded Data in SDI, Continued

---

WSS	
General	Acc. to ETS 300 294 (ETSI) or Vistek Data Sheet 1649 (AFD)
Lines in 625 lines systems	First half of line 23
Output format	According to EN 301 775 V1.1.1.
VITC	
General	According to ISO13818-2
Lines in 625 lines systems	6 to 22 and 319 to 335
Lines in 525 lines systems	10 to 20 and 273 to 282

### DVB Compliant Transparent VBI

Item	Specification
Lines in 625/50	7-23, 319-335
Lines in 525/60	10-22 field 1 and 10-22 field 2 (273 to 284)
Number of lines	≤2 VBI lines per field are transferred transparently if no other DVB VBI is present in that field. ≤1 VBI line per field is transferred transparently if any other DVB VBI is present in that field.
Transferred samples	All luminance samples. Chrominance samples are not transferred.
Output format	According to EN 301 775 V1.1.1.

### Proprietary Transparent VBI

Item	Specification
Lines in 625/50	6-23, 319-335
Lines in 525/60	10-22 field 1 and 10-22 field 2 (273 to 284)
Number of lines	≤4 per field
Transferred samples	All luminance samples. Chrominance samples are not transferred.
Output format	Proprietary



## Embedded Data in SDI, Continued

---

### Embedded Audio

Item	Specification
Location of audio	The encoder accepts audio transmitted in any ancillary data space.
Formatting	According to SMPTE 272M
Audio sampling frequency	48 kHz locked to the video. According to SMPTE 272M
Resolution	20 bits
Number of channels	For each of the stereo audio encoders you can select one of the 8 stereo channels available in an SDI signal.

## Section B - Audio Input and Processing

### Audio Input

---

#### General

Item	Specification
Inputs	Analog, Digital AES/EBU or AES-3id and embedded. AES/EBU is not supported for channels 1 and 2.
Connectors Digital Audio In, Ch. 1 + 2 Analog Audio In, Ch. 1 + 2 Ana/Dig Audio In, Ch. 3 + 4 (option)	2 BNC connectors Top row of terminal block connector Bottom row of terminal block connector
Basic audio channels	2 stereo (stereo channels 1 and 2) or 4 mono
Optional audio channels	2 stereo (stereo channels 3 and 4) or 4 mono

#### Analog Audio Input, Channels 1, 2, 3 and 4 (Terminal Block Connector)

Item	Specification
Input impedance	> 20 k $\Omega$ or 600 $\Omega$ balanced, selectable
Input clipping level	-6 to +24 dBu, selectable, 500 mdBu increments
Return loss	> 30 dB, 20 Hz to 20 kHz, 600 $\Omega$ impedance
CMRR	> 50 dB, 1 kHz

#### AES/EBU Digital Audio Input, Channels 3 and 4 (Bottom Row of Terminal Block Connector)

Item	Specification
Encoding	According to AES3-1992
Input impedance	110 $\Omega$ balanced
Return loss	$\geq$ 21 dB, 0.1 to 6.0 MHz
Input level	2 to 7 V <sub>pp</sub> nominal, min. 500 mV

## Audio Input, Continued

---

### AES-3id Digital Audio Input, Channels 1 and 2 in BNC and 3 and 4 in Terminal Block

Item	Specification
Encoding	According to SMPTE 276M
Input impedance	75 $\Omega$ single-ended
Return loss	$\geq 15$ dB, 0.1 to 6.0 MHz
Input level	0.5 to 2 V <sub>pp</sub> nominal

### AES-3id Reference Output, Channels 3 and 4 in Terminal Block Connector

Item	Specification
Output impedance	75 $\Omega$

## Audio Processing

---

### Audio Performance

Item	Specification
Insertion gain	±0.5 dB
Pass-band frequency response	±0.25 dB, rel. 1 kHz
32 kHz sample rate	20 to 14,500 Hz
44.1 and 48 kHz sample rate	20 to 20,000 Hz
Crosstalk	< -80 dB, 20 Hz to 20 kHz
Gain difference between channels	±0.5 dB, 20 Hz to 20 kHz
Phase difference between channels	< 3°, 20 Hz to 20 kHz

### Layer II Encoding

Item	Specification
Encoding	According to MPEG-1, Layer II
Program modes	Single mono, dual channel, joint stereo, stereo
Audio data bit rate	32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 and 384 kbit/s
Sample frequency	32, 44.1 and 48 kHz

### Layer II Audio Performance (at 384 kbit/s)

Item	Specification
SINAD at 1,020 Hz	> 80 dB
Idle channel noise	< -86 dBq0ps, A-weighted

## Audio Processing, Continued

---

### Dolby Digital Encoding

Item	Specification
Encoding	According to ATSC Standard: Digital Audio Compression (AC-3) Rev. A, August 2001.
Audio Coding Modes	Dual Mono 1+1, Mono 1/0, Stereo 2/0
Audio data rate	56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576 and 640 kbit/s
Sample frequency	32, 44.1 and 48 kHz

### Dolby Digital Audio Performance (at 640 kbit/s)

Item	Specification
SINAD at 1,020 Hz	> 80 dB
Idle channel noise	< -86 dB A-weighted

### Linear Audio Encoding

Item	Specification
No. of channels	1 stereo per audio encoder.
Encoding	Linear
Sample frequency	48 kHz
Resolution	20 bits
Transmission	According to SMPTE 302M

### Passthrough of Dolby E

Item	Specification
Pre-encoding	Encoding by external Dolby E encoder according to ATSC Standard: Digital Audio Compression (AC-3) Rev. A, August 2001.

### Linear Audio/Dolby E Performance

Item	Specification
Frequency response	+/- 0.15 dB re. 1 kHz: 20 to 20,000 Hz
SINAD at 1020 Hz	>80 dB, 3 dB below clipping
Idle channel noise	<-80 dBq0ps, weighted acc. to ITU-R Rec. 468

## Section C - Data Interfaces

### Statmux Interface

Item	Specification
Number of inputs	1
Type of connector	9-pole sub-D female (DCE)
Type of input	Bi-directional, asynchronous RS-232-E
Baud rates as data interface	38400
Data format	8N1, no parity

## Section D - Transport Stream Output

### ASI Output

Item	Specification
Number of outputs	3, one is designated ASI Monitor
Type of connector	75Ω BNC
Output impedance	75Ω according to EN 50083-9
Data amplitude	800 mV peak-peak ± 10% according to EN 50083-9
Return loss	>15 dB, 27 to 270 MHz
Transport stream bit rate	1 to 64 Mbit/s ± 100 ppm
Transport stream formats	According to EN 50083-9. 188 bytes structure, 204 bytes without Reed Solomon, 204 bytes with Reed Solomon. Burst or packet format.
ASI bit rate	270 Mbit/s ± 100 ppm

### IP TS Output

Item	Specification
Number of connectors	1
Usage	IP streaming to main receiver
Type of connector	Eight-pin RJ-45
Ethernet type	100 Base-T
Transport stream bit rate	Follows the ASI output rate
Transport stream formats	188 bytes structure, 204 bytes without Reed Solomon.

### Aux

Item	Specification
Number of connectors	1
Usage	IP streaming to backup receiver <b>or</b> for PCR synchronization
Type of connector	Eight-pin RJ-45
Ethernet type	100 Base-T
Transport stream bit rate	Follows the ASI output rate
Transport stream formats	188 bytes structure, 204 bytes without Reed Solomon.

## Transport Stream Output, Continued

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### Conditional Access

Item	Specification
BISS-E	According to “BISS-E, Basic Interoperable Scrambling System with Encrypted Keys”, EBU Tech 3292 rev. 2, August 2002
BISS Modes	BISS-0 (scrambling off) BISS-1 (Session Word) BISS-E (Clear Session Word) BISS- E (Injected ID and Encrypted Session Word)



## Section E - Control and Management Interfaces

### Ethernet Management Interface

Item	Specification
Number of connectors	1
Type of connector	Eight-pin RJ-45, MDI
Ethernet type	10/100 Base-T
Required setup	IP address, default gateway and subnet mask

### Alarm Interface

Item	Specification
Number of outputs	3, each having one set of contacts closed and one set open during normal operation. Alarms are signalled by reversing the polarity of the two contact sets.
Type of connector	9-pin sub-D female
Max. voltage	$\leq 30$ V AC, $\leq 60$ V DC
Max. current	$\leq 1$ A

### Contact Closure Interface

Item	Specification
Connector type	Terminal block
Usage	DPI according to SCTE 35
8 contacts	Ground + Input/sense

### Cue Tone Interface

Item	Specification
Connector type	Terminal block (shared with contact closure inputs)
Usage	DPI according to SCTE 35
Input Impedance	$>20$ kW
Nominal input level	0 dBu
Input level range	-18 dBu to +6 dBu

## Control and Management Interfaces, Continued

---

### Front Panel Interface

Item	Specification
LCD	2 lines of 40 characters backlit LCD.
Keypad	Arrow keys, 0 to 9, Select, Menu, Prev and F1 to F4 keys. The F1 to F4 keys are not supported in this release.
LEDs	Green LED for power on. Red LED for Alarm indication.

## Section F - Power and General Specifications

### Power

---

#### AC Power Connector

Item	Specification
Number of inputs	1
Type of connector	Standard 3-pin IEC with filter, no switch
Input voltage	100 - 240 V AC $\pm$ 10%
Input power consumption	$\leq$ 75 W fully equipped
Input frequency	47 to 63 Hz
Fuse	2.0 AT fuse in both line and neutral conductor

#### DC Power Connector

Item	Specification
Number of inputs	1
Type of connector	3 pin Tyco male
Input voltage	Nominal voltage 48 V DC, Voltage range -38 to -58 V DC
Input power consumption	$\leq$ 75 W fully equipped
Internal fuse	3.15 AT single fuse in supply conductor

## General

---

### Mechanics

Item	Specification
Sub-rack	According to IEC 297-3
Height	1 U (44.5 mm) (1.75")
Width	482 mm (19")
Depth	480 mm (18.9")
Installation depth	550 mm (21.6")
Weight	7.6 kg (17 lbs)
Connector access	Rear
Grounding stud	M4 screw, non-detachable at rear panel

## General, Continued

---

### Environment

Item	Specification
Storage/Transportation	
General	The product is within the original packaging.
Humidity	95% Relative Humidity at +50°C/122°F according to IEC 60068-2-78. Test: Cab
Temperature	-20 to +70°C (-4 to 158°F)
Vibration, transportation	According to MIL-STD-810E, Method 514.4, Category 1, Basic transportation
Fall, transportation	According to ETS 300 019 part 1-2. Transportation class 2.3, and thus EN/IEC 60068-2-32, test: Ef. Free fall
Operation	
Humidity	95% Relative Humidity at +50°C/122°F according to IEC 60068-2-78. Test: Cab
Temperature	0 to +50°C (32 to 122°F)
Altitude	70 to 106 kPa ETS 300 019 part 1-3 stationary use, Class 3.2 and thus EN/IEC 60068-2-13, test: M
Cooling	Fan-based
Fan lifetime	> 35000 hours at 50°C ambient temperature
EMC	EN 55022 and EN 55 024, EN 61000-3-2 and EN 61000-3-3 and FCC 47 CFR part 15 subpart B class A and AS/NZS CISPR 22.
Safety	According to IEC 60950, EN 60950, UL60950, CSA C22.2 No. 60950-00.
Certifications	
CB	Yes
CE marked	Yes
UL and cUL	Yes
C-Tick marked	Yes



# Appendix B

## Pre-processing

### Overview

---

#### Introduction

This appendix gives background information about pre-processing and the various pre-processing filters used in the D9032 Encoder.

#### In This Appendix

This appendix contains the following topics:

Topic	See Page
Overview	B-2
Delay and Filters	B-4

# Overview

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## Introduction

The D9032 Encoder features optional *PreSightPlus* pre-analysis and *PreSightPlus* noise reduction suite. These two may be used independently of each other or in conjunction. The filtering and analysis together with the encoding control offer an integrated solution for efficient MPEG-2 video encoding, both for fixed rate, statistical multiplexing and for stand-alone VBR.

For the D9032 Encoder you have purchased, specific restrictions may apply to the use of pre-processing. This means that you may only enable the pre-analysis and/or the noise reduction if this is included in the software package for your D9032 Encoder. For further information, see **Installing and Enabling Software Options**, page 5-135.

For the D9032 Encoder, the term “pre-processing” covers noise reduction and pre-analysis. In the GUI of your D9032 Encoder, you may enable or disable the pre-processing. When you have enabled pre-processing, you may then separately enable and disable noise reduction and pre-analysis.

If you have not enabled pre-analysis, you may still use the horizontal luminance and chrominance filters, but you will not get the benefit from the adaptive noise filters or the look-ahead on the encoding and statmux control.

## Pre-analysis

The pre-analysis embraces the techniques the D9032 Encoder applies to gain knowledge about the video material before encoding takes place. It is used to control the encoding, the statmux allocation and the noise reduction filtering.

The *PreSightPlus* analysis suite includes:

- Luminance-level analyzer
- Complexity measure with motion compensation
- Look-ahead
- 3:2 Pulldown detector
- Auto-Concatenation detector

All of the above require that pre-analysis has been enabled. For the highest possible video quality you should enable the pre-analysis. The pre-analysis interacts with the control of the MPEG-2 encoding engine so that MPEG-2 parameters and encoding behavior may be changed dynamically frame by frame.

For statistical multiplexing, the look-ahead of the pre-analysis provides an “early warning” of things to happen in the incoming video source. In that way, the allocation of bits to all the D9032 Encoders that participate in statistical multiplexing runs smoothly and closely coupled to the nature of the video contents.



## Overview, Continued

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### Noise Reduction

The noise reduction option consists of one or more filters that the D9032 Encoder applies before encoding, typically in order to reduce noise or artifacts in the material and to reduce its complexity so that the video material can be encoded at a lower rate without visual degradation.

The optional PreSight*Plus* filter suite includes:

- Adaptive spatial low-pass filter
- Two choices of adaptive temporal filters
- Decision on pixel level
- Horizontal luminance and chrominance filters

The filter suite is particularly suited for statistical multiplexing because a noisy channel can “steal” bits from all the other channels in the multiplex.

Some parts of the filters are controlled by dedicated pre-analysis. You need to enable the pre-analysis suite on the D9032 Encoder to make noise reduction work.

For the noise reduction filter, we recommend that you choose “Default” for automatic filtering according to encoding parameters and video source material. The D9032 Encoder automatically adjusts the filter parameters and the actions frame by frame and even pixel by pixel to get the best filtering with as few side effects as possible. You may choose “Custom” if you want to set up the noise reduction filters according to your own preferences. The custom settings are ignored when you choose “Default”.

In case you do not want the D9032 Encoder to filter the video signal at all before MPEG encoding, you can choose “Off”. The D9032 Encoder still allows horizontal luminance and chrominance low-pass filtering and composite decoding.

## Delay and Filters

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### End-to-end Delay and Pre-processing

The total end-to-end delay becomes longer when you have enabled pre-processing due to the look-ahead delay that is introduced. For applications where the delay is an issue, you may need to disable the pre-processing to keep the end-to-end delay sufficiently low. However, the D9032 Encoder is able to provide better picture quality when you enable the pre-processing.

The end-to-end delay does not change when you enable or disable noise reduction and pre-analysis. Once you have enabled pre-processing, the settings of the pre-analysis and the noise reduction do not change the end-to-end delay. You may therefore change filtering on the run without delay changes. Only when you enable or disable pre-processing altogether the end-to-end delay will change.

For your convenience, the GUI shows the total end-to-end delay, which includes encoding and pre-processing delay, but excludes any additional delay in external equipment, such as implementation delay in decoders. If you have enabled 3:2 PDI (applicable to 525 line systems only) the encoder adds one additional frame of delay.

### Horizontal Filters

The horizontal filters are low-pass filters you may use in addition to the adaptive spatial or temporal filters. You use the horizontal filters to improve the visual appearance during reduced resolution and/or when there's noise in the picture.

The section **Setting Up the Pre-Processor Parameters**, page 5-47 lists the recommended cut-off values for luminance and chrominance for the different horizontal resolutions of the encoder. If your source suffers from noise, you may want to filter more in order to lower the cut-off frequency and thus to reduce the high-frequency noise. As an example, if you have tape material that is not really sharp but still suffers from high-frequency tape noise, the filters can reduce the high-frequency power that does not represent visual information but still loads the encoder.

Also, high-detail content being encoded at reduced horizontal resolution may benefit from horizontal low-pass filtering. This will optimize the look of moving objects with horizontal sharp edges, like grating, fences, trelliswork and lines.

The more you filter, the more suppression you will get of noise and potential aliasing products. However, as you increase filtering, especially above where the cut-off is comparable to the encoding resolution, you will start to lose sharpness of the picture. Hence, you need to trade off the filtering effect and the sharpness. As a starting point, you should use the recommended filtering values.

## Delay and Filters, Continued

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The D9032 Encoder allows you to set different cut-offs for luminance and chrominance. If you use a too high a setting for luminance, the picture will start to lose sharpness, whereas you may turn the chrominance filtering very high without significant visual impairment for a lot of material. If your material is noisy or has been previously encoded, and your encoding rate is low, we recommend that you turn up the chrominance filtering, likely to one of the highest three settings. For reduced horizontal resolution, you may even want to use the highest possible setting.

### Temporal Filters

A temporal filter allows noise reduction by exploiting the time/space dependencies between consecutive frames. The 2-frame temporal filter in the D9032 Encoder intelligently averages pixel values of two consecutive video frames with pixel-to-pixel decision accuracy, controlled by a dedicated pre-analysis. You need to enable the pre-analysis to make the temporal filters work.

The multi-frame 3D temporal filter in the D9032 Encoder takes in multiple frames for the averaging process. Like the 2-frame temporal filter, the filtering decisions and weighting mechanisms are carried out adaptively frame by frame and pixel by pixel.

If you choose “Default” filtering you will get multi-frame 3D temporal filtering where the pre-analysis governs the low-level filtering decisions. You may also choose the multi-frame 3D filter for the “Custom” filtering. If so, you must decide how much filtering you need.

If you choose to set up “Custom” filtering, we recommend that your first choice should be the temporal multi-frame 3D filter. This provides the best noise reduction by the available filters for any kind of noise. The multi-frame 3D temporal filter is more efficient than the spatial filter and gives less smearing, and has a good effect on e.g. camera, VCR and film noise. The filter can also have a good effect on removing noise in e.g. text and graphics in composite sources.

For the multi-frame 3D temporal filter, you can decide how much you want to filter. As you apply a still stronger temporal filter setting, the low-level decisions and back-off mechanisms of the pre-filter are changed to allow more filtering. For that reason, the more you push the slider to the right, the more filtering you get.

For noisy material, you could try to start with one of the upper two filters. For the upper settings you'll even get some suppression of composite artifacts and of quantizing noise from previous encoding. For noisy material, especially when encoding at low rates, the perceived quality will be higher. If you typically operate at higher rates and have good source material, you would likely go for one of the first two settings. The settings in the middle provide a good compromise of filtering and detail preservation.

## Delay and Filters, Continued

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You may want to experiment with the 2-frame temporal filter when you only want limited noise filtering. This filter is designed to have very little impact on the content, though it still eases the burden of the encoder.

The temporal filters of the D9032 Encoder are designed to handle motion and scene cuts with virtually no memory effect. This means that there are no trails or ghosting around moving objects or blurring following a scene cut. The more you move the slider to the left for the multi-frame 3D temporal filter, the more the algorithm will back off close to moving objects and refrain from averaging temporally. However, all settings will make the algorithm protect the motion look.

In contrast to the common simple frame averaging filters that often suffer from motion artefacts, like smearing and moving objects with ghosting, the temporal filter in the D9032 Encoder has little impact on video contents thanks to the decisions made at pixel accuracy and the motion compensation.

**Note:** For custom filtering, you must choose between temporal and spatial filtering. The D9032 Encoder allows only one of the two filters to operate. We would recommend that you turn off the spatial filter and use the temporal filter, unless you are specifically required to use the spatial filter.

### Spatial Filter

As opposed to temporal filters a spatial filter operates within a single video field or frame without taking other fields or frames into consideration (except for the decision on how much to filter). In the D9032 Encoder we offer an adaptive low-pass filter with pixel-to-pixel decision accuracy, controlled by a dedicated pre-analysis. You do not need to enable the pre-analysis to make the spatial filter work properly.

A low-pass filter attenuates high-frequency picture contents, thus reducing picture complexity and noise efficiently. In traditional low-pass filters, the complete video frame is subject to filtering, which in turn softens edges and details.

The low-pass filter in the D9032 Encoder does not filter the complete video frame, but the filter actions are controlled locally in the picture, pixel by pixel, by the pre-analysis. In that way, filtering may take place without unnecessary smoothing of edges. Still, the filter is capable of reducing significant amounts of noise in the picture.

# Appendix C

## Transport Stream Rates

### Overview

---

#### Introduction

This appendix presents the required transport stream rates for the various tributaries such as video, audio, DPI and VBI.

Also, it presents the available transport stream rates on an ASI network.

#### In This Appendix

This appendix contains the following topics:

Topic	See Page
Introduction	C-2
Transport Stream Rates for the Tributaries	C-3
Available Rate on the Transmission Media	C-16

# Introduction

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## General

The D9032 Encoder automatically allocates the necessary transport stream rates for the chosen tributary rates. With the following tables at hand, you may prepare and evaluate a bit rate budget for the D9032 Encoder before actual configuration. The transport stream rates for the tributaries are, apart from the video and audio, rounded up to the nearest kbit/s.

For setting up the bit rate budget for several encoders, see *Multi Encoder Manager, Application Layer, User manual, order number 4013152*.

# Transport Stream Rates for the Tributaries

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## Supported Tributaries

In the D9032 Encoder, the following tributaries can be multiplexed together:

- Video transport stream
- Layer II audio transport stream
- Dolby Digital audio
- Linear Audio/Dolby E
- DVB VBI (VPS, VITC, WSS, transparent lines, DVB-VBI Teletext)
- Transparent lines, proprietary format
- EBU Teletext
- DPI

The SI/PSI rate for the DVB VBI stream is 17.1 kbit/s. The SI/PSI rate for the program is 16.517.1 kbit/s. If you, besides the video program, have an additional audio only program this also takes up 16.5 kbit/s.

To help you to calculate the total TS rate used by the D9032 Encoder the following sections show the transport stream rates of each tributary.

**Note:** Some transport stream rates depend on the video frame rate (625 lines and 25 Hz vs. 525 lines and 29.97... Hz systems), while others don't.

## Transport Stream Rates for the Tributaries, Continued

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### Video<sup>1)</sup>

The required MPEG-2 transport stream rate in the D9032 Encoder primarily depends on the video coding rate, to some extent on the frame rate, but only slightly on the GOP.

The following table shows the required transport stream rates for a selection of video rates. The transport stream rate figures are truncated to two decimals. The variation of the required transport stream rate for different GOPs is within truncation accuracy so you need not take the GOP or line system into consideration. The table applies to both fixed encoding rate and to the maximum instantaneous encoding rate during statistical multiplexing.

For statistical multiplexing, the outgoing TS rate of the D9032 Encoder must have room for the maximum encoding rate that may occur. Use the default video rate when you want to make the TS Rate budget. For further information, see **Making a TS Rate Budget**, page 5-21.

If you have a limitation of the allowed TS rate for statistical multiplexing, you may need to set the maximum encoding rate. Refer to **Setting Up the Statistical Multiplexing**, page 5-38.

Rate Mbit/s	TS Rates Mbit/s
1.5	1.59
2	2.11
2.5	2.62
3	3.13
3.5	3.65
4	4.16
4.5	4.67
5	5.18
5.5	5.70
6	6.21
6.5	6.72
7	7.24

1) Closed captions output packets are part of the video tributary. It is recommended that you only enable the output packets that you know you will use.



## Transport Stream Rates for the Tributaries, Continued

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Rate Mbit/s	TS Rates Mbit/s
7.5	7.75
8	8.26
9	9.29
10	10.31
11	11.34
12	12.36
13	13.39
14	14.42
15	15.44
16	16.47
17	17.49
18	18.52
20	20.57
22	22.62
24	24.67
26	26.72
28	28.78
30	30.83
32	32.88
34	34.93
36	36.98
38	39.03
40	41.08
45	46.21
50	51.34

## Transport Stream Rates for the Tributaries, Continued

### Layer II Audio

The various audio rates require the following transport stream rates. These figures apply to audio attached to the video or to another audio only program, respectively to an audio only program.

Audio Encoding Rate	Required TS Capacity (kbit/s) Audio Attached to the Video or Audio Attached to an Audio Only Program <sup>a)</sup>			Required TS Capacity (kbit/s) Audio Only <sup>1)</sup>		
	32 kHz Sampling Frequency	44.1 kHz Sampling Frequency	48 kHz Sampling Frequency	32 kHz Sampling Frequency	44.1 kHz Sampling Frequency	48 kHz Sampling Frequency
32 kbit/s	36.6	36	39.2	36.6	36	39.2
48 kbit/s	52.2	50.4	54.8	52.2	57.6	54.8
56 kbit/s	62.7	64.8	62.7	62.7	64.8	62.7
64 kbit/s	67.9	72	70.5	73.1	72	70.5
80 kbit/s	83.6	86.4	86.2	88.8	86.4	86.2
96 kbit/s	99.2	100.8	101.8	104.4	108	101.8
112 kbit/s	120.1	122.3	117.5	120.1	122.3	125.3
128 kbit/s	135.8	136.7	133.2	135.8	136.7	141
160 kbit/s	167.1	165.5	172.3	167.1	172.7	172.3
192 kbit/s	198.4	201.5	203.7	203.7	201.5	203.7
224 kbit/s	229.8	230.3	235	235	237.5	235
256 kbit/s	266.3	266.3	266.3	266.3	266.3	266.3
320 kbit/s	329	331.1	329	334.2	331.1	336.8
384 kbit/s	396.9	395.8	399.5	396.9	395.8	399.5

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

## Transport Stream Rates for the Tributaries, Continued

### Dolby Digital/Dolby Digital Passthrough

The various audio rates require the following transport stream rates. These figures apply to audio attached to the video or to another audio only program, respectively to an audio only program.

Audio Encoding Rate	Required TS Capacity (kbit/s) Audio Attached to the Video or Audio Attached to an Audio Only Program <sup>a)</sup>			Required TS Capacity (kbit/s) Audio Only <sup>1)</sup>		
	32 kHz Sampling Frequency	44.1 kHz Sampling Frequency	48 kHz Sampling Frequency	32 kHz Sampling Frequency	44.1 kHz Sampling Frequency	48 kHz Sampling Frequency
56 kbit/s	58.8	59.4	58.8	62.7	64.8	64.6
64 kbit/s	66.6	70.2	70.5	70.5	70.2	70.5
80 kbit/s	86.2	86.4	88.1	86.2	86.4	88.1
96 kbit/s	101.8	102.6	99.9	101.8	102.6	105.8
112 kbit/s	117.5	118.7	117.5	117.5	118.7	123.4
128 kbit/s	133.2	134.9	135.1	137.1	134.9	135.1
160 kbit/s	164.5	167.3	170.4	168.4	167.3	170.4
192 kbit/s	199.8	199.7	199.8	199.8	199.7	199.8
224 kbit/s	231.1	232.1	235	235	232.1	235
256 kbit/s	262.4	264.5	264.4	266.3	264.5	270.3
320 kbit/s	329	329.3	329	332.9	334.7	334.9
384 kbit/s	395.6	394	393.6	395.6	399.4	399.5
448 kbit/s	462.2	458.8	464.1	462.2	464.2	464.1
512 kbit/s	524.8	529	528.8	528.8	529	528.8
576 kbit/s	591.4	593.7	593.4	591.4	593.7	593.4
640 kbit/s	658	658.5	658	658	658.5	658

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

## Transport Stream Rates for the Tributaries, Continued

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### Linear Audio

Linear audio requires the following transport stream rates depending on the selected video frequency and bit depth:

	Required TS Capacity (Mbit/s), <sup>a)</sup>		
Video Frequency (Hz)	Bit Depth (Bits)		
	16	20	24
25	2.0	2.37	2.79
29.97	1.99	2.39	2.8

- a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

### Dolby-E

The required transport stream rate for Dolby-E audio is 2.37 Mbit/s with 25 Hz video frequency and 2.39 Mbit/s with 29.97 Hz video frequency. The bit depth is 20 bits. The figures apply to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

## Transport Stream Rates for the Tributaries, Continued

### DVB VBI, 625 Lines Systems

The required rate for DVB VBI depends on the combination of VPS and WSS lines and the number of transparent lines and teletext lines. The following table shows the required rate for each combination in kbit/s:

	0 Transparent Line			1 Transparent Line			2 Transparent Lines			3 Transparent Lines		
	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS
0 Teletext line	0	37.6	37.6	188	188	225.6	376	376	376	526.4	526.4	564
1 Teletext Line	37.6	37.6	37.6	188	225.6	225.6	376	376	376	526.4	564	564
2 Teletext Lines	37.6	37.6	75.2	225.6	225.6	225.6	376	376	413.6	564	564	564
3 Teletext Lines	37.6	75.2	75.2	225.6	225.6	225.6	376	413.6	413.6	564	564	601.6
4 Teletext Lines	75.2	75.2	75.2	225.6	225.6	263.2	413.6	413.6	413.6	564	564	601.6
5 Teletext Lines	75.2	75.2	75.2	225.6	263.2	263.2	413.6	413.6	413.6	564	601.6	601.6
6 Teletext Lines	75.2	75.2	112.8	263.2	263.2	263.2	413.6	413.6	451.2	601.6	601.6	601.6
7 Teletext Lines	75.2	112.8	112.8	263.2	263.2	263.2	413.6	451.2	451.2	601.6	601.6	639.2
8 Teletext Lines	112.8	112.8	112.8	263.2	263.2	300.8	451.2	451.2	451.2	601.6	601.6	639.2
9 Teletext Lines	112.8	112.8	112.8	263.2	300.8	300.8	451.2	451.2	451.2	601.6	639.2	639.2
10 Teletext Lines	112.8	112.8	150.4	300.8	300.8	300.8	451.2	451.2	488.8	639.2	639.2	639.2

## Transport Stream Rates for the Tributaries, Continued

	0 Transparent Line			1 Transparent Line			2 Transparent Lines			3 Transparent Lines		
	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS
11 Teletext Lines	112.8	150.4	150.4	300.8	300.8	300.8	451.2	488.8	88.8	639.2	639.2	676.8
12 Teletext Lines	150.4	150.4	150.4	300.8	300.8	338.4	488.8	488.8	488.8	639.2	639.2	676.8
13 Teletext Lines	150.4	150.4	150.4	300.8	338.4	338.4	488.8	488.8	488.8	639.2	676.8	676.8
14 Teletext Lines	150.4	150.4	188	338.4	338.4	338.4	488.8	488.8	526.4	676.8	676.8	676.8
15 Teletext Lines	150.4	188	188	338.4	338.4	338.4	488.8	526.4	526.4	676.8	676.8	714.4
16 Teletext Lines	188	188	188	338.4	338.4	376	526.4	526.4	526.4	676.8	676.8	714.4
17 Teletext Lines	188	188	188	338.4	376	376	526.4	526.4	526.4	676.8	714.4	714.4
18 Teletext Lines	188	188	225.6	376	376	376	526.4	526.4	564	714.4	714.4	714.4
19 Teletext Lines	188	225.6	225.6	376	376	376	526.4	564	564	714.4	714.4	752
20 Teletext Lines	225.6	225.6	225.6	376	376	413.6	564	564	564	714.4	714.4	752
21 Teletext Lines	225.6	225.6	225.6	376	413.6	413.6	564	564	564	714.4	752	752
22 Teletext Lines	225.6	225.6	263.2	413.6	413.6	413.6	564	564	601.6	752	752	752
23 Teletext Lines	225.6	263.2	263.2	413.6	413.6	413.6	564	601.6	601.6	752	752	789.6

## Transport Stream Rates for the Tributaries, Continued

	0 Transparent Line			1 Transparent Line			2 Transparent Lines			3 Transparent Lines		
	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS	No WSS or VPS	Either WSS or VPS	Both WSS and VPS
24 Teletext Lines	263.2	263.2	263.2	413.6	413.6	451.2	601.6	601.6	601.6	752	752	789.6
25 Teletext Lines	263.2	263.2	263.2	413.6	451.2	451.2	601.6	601.6	601.6	752	789.6	789.6
26 Teletext Lines	263.2	263.2	300.8	451.2	451.2	451.2	601.6	601.6	639.2	789.6	789.6	789.6
27 Teletext Lines	263.2	00.8	300.8	451.2	451.2	451.2	601.6	639.2	639.2	789.6	789.6	827.2
28 Teletext Lines	300.8	300.8	300.8	451.2	451.2	488.8	639.2	639.2	639.2	789.6	789.6	827.2
29 Teletext Lines	300.8	300.8	300.8	451.2	488.8	488.8	639.2	639.2	639.2	789.6	827.2	827.2
30 Teletext Lines	300.8	300.8	338.4	488.8	488.8	488.8	639.2	639.2	676.8	827.2	827.2	827.2
31 Teletext Lines	300.8	338.4	338.4	488.8	488.8	488.8	639.2	676.8	676.8	827.2	827.2	864.8
32 Teletext Lines	338.4	338.4	338.4	88.8	488.8	526.4	676.8	676.8	676.8	827.2	827.2	864.8

In 625 lines systems with 4 transparent lines enabled the bit rate is 714.4 kbit/s

## Transport Stream Rates for the Tributaries, Continued

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### DVB VBI, 525 Lines Systems

In 525 lines system the required rate for DVB VBI solely depends on the enabled number of transparent lines:

Number of Enabled Transparent Lines	Required TS Rate
1	225.4 kbit/s
2	450.7 kbit/s
3	631 kbit/s
4	856.4 kbit/s



## Transport Stream Rates for the Tributaries, Continued

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### Proprietary Transparent Lines

The D9032 Encoder supports up to 4 transparent lines per field. The lines are sent as proprietary data in sub\_id 0x02. When enabled, the following transport stream rates are required:

No. of Transparent Lines	Total Required TS Rate 625 Lines	Total Required TS Rate 525 Lines
1	227 kbit/s	272 kbit/s
2	452 (kbit/s)	542 kbit/s
3	678 kbit/s	812 kbit/s
4	903 kbit/s	1083 kbit/s
5	1128 kbit/s	1353 kbit/s
6	1355 kbit/s	1623 kbit/s
7	1580 kbit/s	1895 kbit/s
8	1836 kbit/s	2165 kbit/s

## Transport Stream Rates for the Tributaries, Continued

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### EBU Teletext

The required transport stream rate depends on the number of teletext lines. Refer to the table below:

<b>Max. Teletext Lines per Field</b>	<b>Total Required TS Teletext B, PAL</b>
1	38 kbit/s
2 or 3	76 kbit/s
4 or 5	113 kbit/s
6 or 7	151 kbit/s
8 or 9	188 kbit/s
10 or 11	226 kbit/s
12 or 13	264 kbit/s
14 or 15	301 kbit/s
16	339 kbit/s

The set-up in the GUI defines the number of lines per field. The total number of lines per video frame is twice the number of lines per field.

## Transport Stream Rates for the Tributaries, Continued

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### DPI

For each DPI channel a maximum of 1 DPI transport stream packet can be sent per frame period. This gives the following maximum bit rates for different frame rates and packet modes.

Frame Rate	188 Bytes Mode	204 Bytes Mode
25 Hz	37.60 kbit/s	40.80 kbit/s
29.97 Hz	45.07 kbit/s	48.91 kbit/s

## Available Rate on the Transmission Media

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### ASI

The rate of the ASI output is set up by the user to match the transmission media or any other device to follow the D9032 Encoder.

The maximum available transport stream rate is limited by the hardware. The maximum transport stream rate of the D9032 Encoder is 64 Mbit/s output.

**Note:** When you select Reed-Solomon (RS) forward error-correction (FEC) or the 204 byte format without RS the payload transport stream rate is reduced to 188/204 of the specified transport stream rate.

### Satellite Interfaces

A satellite modulator may be connected to the ASI output of the D9032 Encoder. The available transport stream rate on the satellite link depends on the modulation, the symbol rate (= Baud rate) and the code rate according to the following formula:

$$\text{Transport stream rate} = R_s * 188/204 * \text{code rate} * n$$

where:

$R_s$  is the symbol rate in MBaud or Msymbols/sec,  
the 188/204 refers to the outer Reed-Solomon coding in the modulator,  
 $n = 2$  for QPSK, 3 for 8PSK and 4 for 16QAM,  
and the code rate is the rate of the inner coding (1/2, 2/3, 3/4, 5/6 and 7/8).

The transport stream rate of the D9032 Encoder shall be set up to equal the rate calculated by the formula above. Remember to disable the RS in the D9032 Encoder

The maximum transport stream rate is determined by the ASI interface, or the satellite modulator, whichever is lowest. Note that satellite modulators often have a minimum transport stream rate that is much higher than the minimum transport stream rate of the D9032 Encoder.

**Note:** 10 Mbaud gives the following transport stream rate with 8PSK modulation with 7/8 code rate:

$$10 \text{ Mbaud} * 188/204 * 7/8 * 3 = 24.9 \text{ Mbit/s}$$

# Appendix D

## ISO 639-2 Language Codes

### Overview

---

#### Introduction

This appendix lists the Standard Codes for the Representation of Names of Languages according to ISO 639-2.

#### In This Appendix

This appendix contains the following topics:

Topic	See Page
Language Codes - Sorted by Alpha 3-Letter Code (ISO 639-2)	D-2

## Language Codes - Sorted by Alpha 3-Letter Code (ISO 639-2)

---

### ISO 639-2

This table is based on the ISO 639-2 Standard Codes for the Representation of Names of Languages.

Language Code	Code
Abkhazian	abk
Afar	aar
Afrikaans	afr
Albanian	alb/sqi <sup>a)</sup>
Amharic	amh
Arabic	ara
Aragonese	arg
Armenian	arm/hye <sup>a)</sup>
Assamese	asm
Avestan	ave
Aymara	aym
Azerbaijani	aze
Bashkir	bak
Basque	baq/eus <sup>a)</sup>
Belarusian	bel
Bengali	ben
Bihari	bih
Bislama	bis
Bosnian	bos
Breton	bre
Bulgarian	bul
Burmese	bur/mya <sup>a)</sup>
Catalan	cat
Chamorro	cha
Chechen	che

Language Code	Code
Chinese	chi/zho <sup>a)</sup>
Church	Slavonic
Chuvash	chv
Cornish	cor
Corsican	cos
Croatian	scr/hrv <sup>a)</sup>
Czech	cze/ces <sup>a)</sup>
Danish	dan
Dutch	dut/nld <sup>a)</sup>
Dzongkha	dzo
English	eng
Esperanto	epo
Estonian	est
Faroese	fao
Fijian	fij
Finnish	fin
French	fre/fra <sup>a)</sup>
Frisian	fry
Gaelic;	Gaelic
Gallegan	glg
Georgian	geo/kat <sup>a)</sup>
German	ger/deu <sup>a)</sup>
Greek (1453-)	gre/ell <sup>a)</sup>
Guarani	grn
Gujarati	guj
Haitian	Creole
Hausa	hau
Hebrew	heb
Herero	her

Language Code	Code
Hindi	hin
Hiri	ho
Hungarian	hun
Icelandic	ice/isl <sup>a)</sup>
Ido	ido
Indonesian	ind
Interlingua	ina
Interlingue	ile
Inuktitut	iku
Inupiaq	ipk
Irish	gle
Italian	ita
Japanese	jpn
Javanese	jav
Kalaallisut	kal
Kannada	kan
Kashmiri	kas
Kazakh	kaz
Khmer	khm
Kikuyu;	ki
Kinyarwanda	kin
Kirghiz	kir
Komi	kom
Korean	kor
Kuanyama;	kj
Kurdish	kur
Lao	lao
Latin	lat
Latvian	lav



Language Code	Code
Limburgan;	Limburgish
Lingala	lin
Lithuanian	lit
Luxembourgish;	lb
Macedonian	mac/mkd <sup>a)</sup>
Malagasy	mlg
Malay	may/msa <sup>a)</sup>
Malayalam	mal
Maltese	mlt
Manx	glv
Maori	mao/mri <sup>a)</sup>
Marathi	mar
Marshallese	mah
Moldavian	mol
Mongolian	mon
Nauru	nau
Navaho,	nv
Ndebele,	nr
Ndebele,	nd
Ndonga	ndo
Nepali	nep
Northern	se
Norwegian	nn
Norwegian	nb
Norwegian	nor
Nyanja;	Chewa
Occitan (1500-);	oci
Oriya	ori
Oromo	orm

Language Code	Code
Ossetian;	os
Pali	pli
Panjabi	pan
Persian	per/fas <sup>a)</sup>
Polish	pol
Portuguese	por
Pushto	pus
Quechua	que
Raeto-Romance	roh
Romanian	rum/ron <sup>a)</sup>
Rundi	run
Russian	rus
Samoan	smo
Sango	sag
Sanskrit	san
Sardinian	srd
Serbian	scc/srp <sup>a)</sup>
Shona	sna
Sichuan	ii
Sindhi	snd
Sinhalese	sin
Slovak	slo/slk <sup>a)</sup>
Slovenian	slv
Somali	som
Sotho,	st
Spanish;	es
Sundanese	sun
Swahili	swa
Swati	ssw

Language Code	Code
Swedish	swe
Tagalog	tgl
Tahitian	tah
Tajik	tgk
Tamil	tam
Tatar	tat
Telugu	tel
Thai	tha
Tibetan	tib/bod <sup>a)</sup>
Tigrinya	tir
Tonga	tog
Tsonga	tso
Tswana	tsn
Turkish	tur
Turkmen	tuk
Twi	twi
Uighur	uig
Ukrainian	ukr
Urdu	urd
Uzbek	uzb
Vietnamese	vie
Volapuk	vol
Walloon	wln
Welsh	wel/cym <sup>a)</sup>
Wolof	wol
Xhosa	xho
Yiddish	yid
Yoruba	yor
Zhuang	za

Language Code	Code
Zulu	zul

- a. Languages that have two synonymous codes.

# Appendix E

## SNMP Quick Setup Guide

### Overview

---

#### Introduction

This appendix is a quick guide to the Simple Network Management Protocol (SNMP).

#### In This Appendix

This appendix contains the following topics:

Topic	See Page
Introduction	E-2
SNMP Managers	E-4
SNMP Hints and Common Pitfalls	E-5

# Introduction

---

## The SNMP Protocol

SNMP is a protocol for management of remote devices. It was designed for managing all kinds of devices such as routers, printers and also broadcast equipment from companies like Scientific Atlanta. You may find further reference information on SNMP in RFC 1157.

Though SNMP can support different transport layer protocols, the SNMP commonly runs on top of the Internet protocol UDP. Which transport layer protocol to choose is up to the capabilities of the managed devices and the requirements of reliability provided by the transport protocol layer. The D9032 Encoder uses the UDP protocol.

## SNMP Versions

There are 3 SNMP versions, which are commonly used:

1. SNMPv1 with limited security.
2. SNMPv2c with simple authentication scheme using community strings.
3. SNMPv3 with more elaborate authentication schemes, and data encryption support.

The D9032 Encoder uses the SNMPv2c as this is widely supported, and does not have the security flaws of the SNMPv1 version.

## SNMP Terminology

SNMP defines the managing system as an SNMP manager and the remote devices as SNMP agents. The D9032 Encoder is an SNMP agent.

## Management Information Bases

Management Information bases (MIBs) are textual descriptions of the structure and types of data expected to be exchanged between a SNMP manager and its agents. It is usually up to the agent manufacturer to provide the MIB. The MIB tells the SNMP manager which data can be exchanged and how the data is formatted. A MIB file is available from Scientific Atlanta for the D9032 Encoder to support 3<sup>rd</sup> party SNMP managers. When first released a MIB can not be changed in the sense that is not allowed to remove descriptions already defined in the MIB. It is possible to add new structures and data and/or extend existing ones. You may find further reference information on MIB files in RFC 1213.

An SNMP manager can get/set from/to data agent in various ways depending on the SNMP version run so its vital for the manager to know its agents capabilities.

## Introduction, Continued

---

### SNMP Trap

In case of an error/informational condition the SNMP agent, i.e. the D9032 Encoder, can autonomously send data information to the SNMP manager(s) called SNMP traps. These may be logged or cause new alarms to be generated.

### OID: Object Identifier

An OID is a globally unique number to identify every company, every SNMP device and even single values, which the SNMP manager can get from or set in the SNMP agent.

**Example:** The OID number “1.3.6.1.4.1.1482” denotes the company Scientific Atlanta and “1.3.6.1.4.1.1482.20.3.2.10.1.10.1.4” denotes the TS-network name in a D9032 Encoder. These granted numbers do not change.

# SNMP Managers

---

## MIB Browser

A MIB browser is a simple kind of SNMP manager, which can be used to communicate with SNMP agents. It typically has a tree structure which the user can browse through to set/get values.



## SNMP Hints and Common Pitfalls

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### Firewalls

An SNMP manager uses by default port 161 (get/set) and port 162 for trap reception on its socket interface. Firewalls typically have socket ports below 1024 under observation and can therefore block reception of traps and in some cases refuse to get/set commands depending on the setup of the firewall. Please make sure that the SNMP ports are released by the firewall.

### SNMP Request Time-out

Depending on the load of the network the SNMP manager is connected to, time-outs may occur if the SNMP time-out value is too small. You may need to increase request time-out to ensure reliable operation.



# Appendix F

## Equipment and Accessories

### Overview

---

#### Introduction

This appendix contains names and part numbers of equipment and accessories for the D9032 Encoder.

#### In This Appendix

This appendix contains the following topics:

Topic	See Page
Accessory Kit for the D9032 Encoder	F-2
Options and Accessories	F-3

## Accessory Kit for the D9032 Encoder

---

### Accessory Kit

The accessory kit for the D9032 Encoder is included in the delivery. It has the part number 4008916 and contains the following items:

Part number	Description
4019394 Rev B	Encoder Model D9032, User and Service Manual
196788	4 spring cage plugs for terminal block connectors

## Options and Accessories

---

### Basic Configurations

The following basic configurations are available:

Part number	Description
4013873x <sup>a</sup> 00	D9032 Encoder - PAL/NTSC dual pass 4:2:0 SD encoder, 2 stereo audio, Dolby AC3 and Dolby E passthrough, Layer II audio, Closed Captions, ASI/IP output.
4013873x <sup>a</sup> 10	D9032 Encoder - PAL/NTSC dual pass 4:2:0 SD encoder, 4 stereo audio, Dolby AC3 and Dolby E passthrough, Layer II audio, Closed Captions, ASI/IP output.
4013873x <sup>a</sup> 01	D9032 Encoder - PAL/NTSC ClearSight 4:2:0 SD encoder, 2 stereo audio, Dolby AC3 and Dolby E passthrough, Layer II audio, Closed Captions, ASI/IP output.
4013873x <sup>a</sup> 11	D9032 Encoder - PAL/NTSC ClearSight 4:2:0 SD encoder, 4 stereo audio, Dolby AC3 and Dolby E passthrough, Layer II audio, Closed Captions, ASI/IP output.
4013873x <sup>a</sup> 02	D9032 Encoder - PAL/NTSC ClearSight/SDI 4:2:0 SD encoder, 2 stereo audio, Dolby AC3 and Dolby E passthrough, Layer II audio, Closed Captions, ASI/IP output.
4013873x <sup>a</sup> 12	D9032 Encoder - PAL/NTSC ClearSight/SDI 4:2:0 SD encoder, 4 stereo audio, Dolby AC3 and Dolby E passthrough, Layer II audio, Closed Captions, ASI/IP output.

- a. X =1 denotes DC power supply unit, 2 denotes AC power supply unit with EU power cord, 3 denotes AC power supply unit with US power cord, 4 denotes AC power supply unit with UK power cord and 5 denotes AC power supply unit with AU power cord.

## Options and Accessories, Continued

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### Software Options

The following software options are available:

Part number	Description
7012281	IP Statistical Multiplexing
70062590	DPI signalling
70062580	Statistical Multiplexing
70041750	4:2:2
70041730	PreSight <i>Plus</i> Noise Reduction <sup>a)</sup>
40091530	Dolby Digital Channel 1 and 2 <sup>a)</sup>
40091540	Dolby Digital Channel 3 and 4 <sup>a)</sup>
70047060	Auto-Concatenation
4015093	SDI Input (combined ClearSight and SDI module)

a. Pre-installed in all North American basic configurations

## Options and Accessories, Continued

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### Optional Accessories

The following optional accessories are available:

Part number	Description	To be used/Comment
4008850	Kit, AC Power Supply Unit	Spare part.
4009980	Kit, DC Power Supply Unit	Spare part.
4008940	Kit, fan unit	The fan lifetime is at least 4 years at 45°C ambient temperature.
4008851	Kit, Dual Audio Module	Spare part.
4015092	Kit, Advanced Video Input Board	Spare part/upgrade kit.
4012334 <sup>a)</sup>	H.264 upgrade kit	Upgrade kit.

a. See the AVC/MPEG-4/H.264 license notice in the Notices section at the front of the manual.





# Appendix G

## References

### Applicable Documents

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<b>AES3-1992</b>	Serial transmission format for two-channel linearly represented digital audio data.
<b>ANSI/SMPTE 12M-1995</b>	Television, Audio and Film ---- Time and Control Code
<b>AS/NZS, 2002</b>	Limits and methods of measurements of radio disturbance characteristics of information technology equipment.
<b>ATSC Standard, August 2001</b>	Digital Audio Compression (AC-3) Rev. A
<b>708-B, December 1999</b>	Digital Television (DTV) Closed Captioning
<b>CSA C 22.2 No. 60950, 2000</b>	Safety of information technology equipment.
<b>EIATIA-232-E, 1991</b>	Interface between data terminal equipment and data circuits.
<b>EN 55022, 1998 including A1, 2000</b>	Limits and methods of measurements of radio disturbance characteristics of information technology equipment.
<b>EN 55024, 1998 including A1, 2001</b>	Information technology equipment - Immunity characteristics - Limits and method of measurement.
<b>EN 60950, 2000</b>	Safety of information technology equipment.
<b>EN 61000-3-2, 2000</b>	Limits for harmonic current emission.
<b>EN 61000-3-3, 1995 including A1, 2001</b>	Limitations of voltage fluctuations and flicker.
<b>EN 300 468 V1.4.1</b>	"Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".
<b>EN 50083-9 E 1998</b>	"Interfaces for CATV/SMATV headends and similar professional equipment"
<b>ETR 162 E1</b>	"Allocation of Service Information (SI) codes for DVB systems".
<b>ETR 211 E.2 - 1997</b>	"Digital broadcasting systems for television; guidelines on implementation and usage of service information".
<b>ETR 290, 05 1997</b>	Measurement guidelines for DVB systems.
<b>ETSI EN 300 468 V1.4.1, 2000-11</b>	Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems.

## Applicable Documents, Continued

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<b>ETSI TR 102 154 v1.1.1, 2001-04</b>	Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in Contribution and Primary Distribution Applications.
<b>FCC CFR 47 Part 15</b>	Radio Frequency Devices.
<b>IEC 60950, 1999</b>	Safety of information technology equipment.
<b>IEC 68-2-1, IEC 68-2-6</b>	Basic Environmental Testing Procedures.
<b>IEC 68-2-29, 1987, IEC 68-2-56</b>	Basic Environmental Testing Procedures.
<b>IEEE 802.3, 1996</b>	IEEE Standard for Local and metropolitan area networks. Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.
<b>ISO/IEC 11172-3 - 1993</b>	"Information Technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part3: Audio."
<b>ISO/IEC 13818-1, 1995</b>	Generic Coding of Moving Pictures and Associated Audio: Systems - Part1:Audio."
<b>ISO/IEC 13818-2 - 2000</b>	"Information Technology - Generic coding of moving pictures and associated audio - Part 2: Video."
<b>ISO/IEC 13818-3 - 1994</b>	"Information Technology - Generic coding of moving pictures and associated audio - Part 3: Audio."
<b>ITU-R BT. 470-6</b>	"Conventional Television Systems"
<b>ITU-T Rec. G.742, 1972</b>	"Second order digital multiplex equipment operating at 8448 kbit/s and using positive justification"
<b>ITU-R Rec. 647, 1986</b>	A digital audio interface for broadcasting studios.
<b>RFC 791, 1981</b>	Internet protocol, protocol specification.
<b>RFC 867, 1985</b>	Daytime Protocol.
<b>RFC 4133</b>	Entity MIB
<b>RFC 4152</b>	URN for the CLEI Code
<b>RFC 1904, 1996</b>	Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2).
<b>SMPTE 272M, 1994</b>	Proposed edition, "Formatting AES/EBU Audio and Auxiliary Data into Digital Video Ancillary Data Space."
<b>SMPTE 291M, 1998</b>	Proposed edition, "Ancillary Data Packet and Space Formatting".
<b>SMPTE RP 168, 2002</b>	"Definition of vertical switching point for synchronous switching."

## Applicable Documents, Continued

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**TR 101 154 V1.4.1** “Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 systems; Video and audio in satellite, cable and terrestrial broadcasting applications.”

**UL 60950, 2000** Safety of information technology equipment.



## Glossary

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AES-EBU	Audio Engineering Society/European Broadcasting Union. AES/EBU is the name of a digital audio transfer standard. The AES and EBU developed the specifications for the standard. AES/EBU is an alternative to the S/PDIF standard.
ASCII	American Standard Code for Information Interchange. The ASCII set of 128 characters includes letters, numbers, punctuation, and control codes. Each letter or other character is represented by a number.
ASI	Asynchronous Serial Interface. A 270 Mbit/s data stream similar to the 270 Mbit/s SDI signal. Note that the 270 Mbit/s is only the ASI rate. You may put in any MPEG stream from about 1.5 Mbit/s to 120 Mbit/s
ASI	Asynchronous Serial Interface. A 270 Mbit/s data stream similar to the 270 Mbit/s SDI signal. Note that the 270 Mbit/s is only the ASI rate. You may put in any MPEG stream from about 1.5 Mbit/s to 64 Mbit/s
ASI	Asynchronous Serial Interface. A 270 Mbit/s data stream similar to the 270 Mbit/s SDI signal. Note that the 270 Mbit/s is only the ASI rate. You may put in any MPEG stream from about 1.5 Mbit/s to 64 Mbit/s.
Aspect ratio	The width-to-height ratio of an image. A 4:3 aspect ratio means the horizontal size is a third again wider than the vertical size. Standard television ratio is 4:3 (or 1.33:1). Wide screen DVD and HTDV aspect ratio is 16:9 (or 1.78:1)
BISS	Basic Interoperable Scrambling System.
B-pictures	Bidirectionally Predictive Pictures. Pictures that are coded based on both preceding and subsequent pictures.
CA	Content Advisory data
Clear Session Word	The clear session word is the 12-character unencrypted BISS-E key that is used to scramble/descramble the transmitted data. The clear SW, once entered via the user interface, is not readable through any unit interface
DCE	Data Communication Equipment
DPI	Digital Program Insertion
DTMF	Dual-Tone-Multi-Frequency. There is no baseband multiplexing done on DTMF signals. The signal generated by a DTMF encoder is a direct algebraic summation, in real time, of the amplitudes of two sine (cosine) waves of different frequencies.
DVB	Digital Video Broadcasting

## Glossary, Continued

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ESW	Encrypted Session Word. The encrypted session word (ESW) and the injected ID are used to calculate the Session Word (SW). ESWs can be communicated using a non-secure channel
ETS	European Telecommunications Standards
FEC	Forward Error Correction. The amount of redundancy available in the Input Signal. This redundancy is used by the Forward Error Correction routine to detect and correct channel errors.
GOP	Group Of Pictures. A GOP is a picture sequence which can be coded as an entity. E.g. you can cut between GOPs. Therefore the first picture in a GOP has to be intra-coded (I-picture). Time codes are carried on GOP level.
GUI	Graphical User Interface
Injected ID	An identifier can be entered (injected) in an encoder or a receiver (IRD). This injected ID can be entered in a single or a group of units. This allows a BISS-E protected transmission to a group of encoders/IRDs
IP	Internet Protocol. The TCP/IP Transmission Control Protocol/ Internet Protocol is the basic communication language or protocol of the Internet.
I-picture	Intra coded pictures. Pictures that are coded individually without references to other pictures. For that reason, an I-picture can be decoded separately.
LED	Light Emitting Diode
LTC	Longitudinal Time Code. The time code that is recorded on a special address track on videotape.
MDI	Media Dependant Interface
MIB	Management Information Base
MTU	Maximum Transmission Unit. The greatest amount of data or packet size that can be transferred in one physical frame on a network. This packet also contains the header and trailer information.
NIT	Network Information Table. Provides information about the physical network.
NTSC	National Television Systems Committee. The American TV transmission standard, which uses an interlaced 525-line 30-frames per second picture.
PAL	Phase Alternating Line. (European TV transmission standard,

## Glossary, Continued

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	found in several variants. Uses an interlaced 625-line 25-frames per second picture, except PAL-M (only in Brazil) which uses an interlaced 525-line 30-frames per second picture).
PCM	Pulse Code Modulation. A process in which a signal is sampled, and each sample is quantized independently of other samples and converted by encoding to a digital signal.
PCR	Program Clock Recovery.
PMT	Program Map Table. Identifies and indicates the locations of the streams that make up each service, and the location of the Program Clock Reference fields for a service.
P-picture	Predictively coded pictures. Pictures which have been coded based on a motion compensated prediction. The motion compensation is causal, that is, only based on preceding pictures, which can be I-pictures or P-pictures.
PSI	Program Specific Information. Normative data necessary for the demultiplexing of TSs and the regeneration of programs
QAM	Quadrature Amplitude Modulation. QAM is a method of combining two amplitude-modulated (AM) signals into a single channel, thereby doubling the effective bandwidth.
QPSK	Quaternary Phase Shift Keying. A common form of phase modulation that transmits two bits per Hertz. Thus, a 6 MHz channel supports 12 Mbit/s.
RS	Reed-Solomon Coding. FEC algorithm optimized to correct errors in the transmission caused by transient noise (burst errors).
S/PDIF	Sony/Philips Digital Interface is a standard audio transfer file format. It allows the transfer of audio from one file to another without the conversion to and from an analog format, which could degrade the signal quality.
SDI	Serial Digital Interface. 270 Mbit/s digital video format.
SDT	Service Description Table
SINAD	Signal-to-Noise ratio And Distortion
SMPTE	Society of Motion Picture and Television Engineers
SNMP	Simple Network Management Protocol. SNMP is an internet standard protocol developed to manage nodes such as servers, workstations, routers, switches and hubs on an IP network
SPI	Synchronous Parallel Interface
SW	Session Word. The session word is the key that is used in the TS

## Glossary, Continued

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	processing units to descramble the transmitted data.
Teletext	A digital data broadcasting service transmitted in the field blanking interval of the television signal. Teletext is intended to display text or pictorial material on television receivers equipped with a Teletext decoder
THD	Total Harmonic Distortion
TIA	Telecommunications Industry Association. The TIA is a national trade organization of companies that provide communications and information technology products, systems, distribution services and professional services in the US and around the world. , –
TS	Transport Stream
TTL	Time To Live.
UDP	User Datagram Protocol. A connectionless protocol that, like TCP, runs on top of IP networks. Unlike TCP/IP, UDP/IP provides very few error recovery services, offering instead a direct way to send and receive datagrams over an IP network.
VBI	Vertical Blanking Interval. The VBI is the first 22 lines in each field of a PAL signal (15 lines in an NTSC signal). These lines do not contain any video information, but are used for field synchronization purposes.
VII	Video Index Information.
VPS	Video Program System. A system that facilitates programming of video recorders with the program identification code (from the TV program). Recording automatically begins when the video recorder finds the matching code in the incoming video signal.



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